PUTTING SPAIN BACK IN SPANISH INFLUENZA:

Quantifying the timing and mortality impact in Madrid of the 1918-1921 pandemic through spatial, demographic, and social lenses

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Chapter 7

Conclusion

7.1 A short review of the thesis

In the introduction, the history of influenza epidemics in the past contextualizes the strength and great mortality impact of the 1918 pandemic in the history of the world. The focus then shifts to Madrid and its rapid growth. At the time of the influenza epidemic, the city had higher than average, but declining, death rates. Within and between neighborhoods, inequality was also present, and it was amplified by continued in-migration to the city and the subsequent crowding that occurred due to the inability for the city's infrastructure to grow at the same pace as its population.

The second chapter reexamines the path of the fall 1918 wave of Spanish flu through the country, looking at the timing, duration, and strength of each wave in each province, its capital, and its non-capital population. The results showed a clear gradient from the northeast to the west and south, particularly prevalent on what would have been a train route bringing migrant workers in southern France back to their homes in Portugal and southern Spain as the first world war concluded.

Following the examination of the fall wave across Spain, the third chapter also looks at a larger picture and the general estimation of a seasonal baseline. The importance of the chapter is relevant to all subject matter with yearly seasonality and stresses the flexibility of different estimation methods, as well as how using aggregated data may also be a viable option to estimate seasonality. Furthermore, all calculations use mortality data for the city of Madrid during the Spanish flu, providing an introduction to the theme of the following chapters.

Next, the information presented in the third chapter is used to quantify age-specific excess mortality in Madrid during three distinct periods encapsulating four consecutive epidemic waves between 1918-1920. The results are contextualized within the greater framework of age-specific mortality during the world-wide Spanish Influenza pandemic and the importance of consecutive waves may have played in changing amounts of excess mortality and the ages greatest affected.

Following the calculation of excess deaths, the thesis delves into a social dimension, seeking to understand the relationship between demographic and socioeconomic variables and a neighborhood's environment and mortality experience during the pandemic. This is at the heart of an ongoing debate about large-scale epidemics, in which researchers seek to understand how individual and group social and economic status relate to influenza morbidity and mortality. The chapter adds to this conversation through the examination of excess mortality in neighborhoods during individual waves and through the entirety of the outbreaks. The results find that, in the unique case of Madrid, while there is little evidence to suggest social indicators such as literacy or occupational class play a role in excess mortality, the overall level of mortality prior to the outbreaks is highly positively correlated with the amount of excess mortality observed in each wave. That is to say, the analysis finds neighborhoods that already experienced high mortality rates prior to the epidemic *also* generally faced higher amounts of excess mortality during the outbreaks, and this mattered *more* than other socioeconomic indicators, even when considering consecutive waves of the flu.

Outside factors may also play a role in the resurgence of an epidemic. For example, evidence has been found to support school closures may mitigate an epidemic [63]. However, if reopened too early, transmission can continue and an epidemic reappear. Researchers must seek to understand how and where, given that the first wave may have spread some immunity within the population, the subsequent waves may have the greatest impact on the population.

After presenting traditional excess mortality estimates, the final analysis presented as a part of this thesis introduces the idea of seasonal death tables, so that the mortality impact of each wave can be examined using fundamental demographic methods. Here, the analysis finds large differences in the change in life expectancy by wave, and also finds clear evidence of a harvesting effect of individuals with tuberculosis during the fall wave. The concepts introduced and methods used can be used not only to look at changes during epidemic waves but also at changes in mortality seasonality over time.

7.2 Largest contributions of thesis

7.2.1 Consecutive waves

Perhaps the largest contribution of this thesis is the continued focus, on the role that consecutive waves played in both increasing overall mortality *and* potentially tampering mortality in particularly virulent subsequent waves via acquired immunity in the herald wave. Recent work has highlighted the prevalence, characteristics, and overall importance of herald waves in 1918, but additional work must be done to contextualize the relationship between waves in a given environment [255]. It is true that many places in the world, particularly in rural areas, did not face an earlier herald wave, and thus, in these locales the role of consecutive waves cannot be studied. However, while this was only the second pandemic in a largely industrialized, well connected world, these rural places without a herald wave were less connected and therefore, did not have exposure to the earliest, less virulent strains of the virus.

Even the most rural places in contemporary society are largely much better connected than those in 1918, and thus, the importance of studying the Herald wave's impact cannot be understated. That is to say, should another virus with a potential impact similar to that of the Spanish flu begin to circulate, the interconnectedness of the world will likely play a much larger role in transmitting early strains of the virus globally. In this sense, waves similar to that of the Herald wave in 1918 are more likely to impact areas beyond those during the initial phase of the Spanish flu. As a result, the overall spread and effect of subsequent waves may be more similar to that of areas that experienced a progression of several waves in 1918, such as Madrid. By examining each epidemic wave in Madrid individually *and* in the context of prior and subsequent waves, this thesis paints a larger picture of the potential effects for future outbreaks, much more so than other works that focus on singular waves.

However, while the herald waves may also have provided some immunity to parts of the population, the large amount of people moving at the time likely also contributed to the transmission of the virus. As identified in the introduction, soldiers lived in poor housing and often moved, between (initially) their homes, training camps closer to their homes and home countries, holding camps near the front lines, and the front lines themselves [36, 247, 262]. Moreover, the overall movement of civilians was high due to disruptions in the workforce. Would-be workers became soldiers, and these jobs were filled by other people ready to contribute to the war effort or find better paid work [36, 40, 236]. Thus, the continued influx of new individuals to these locales likely also contributed to overall higher mortality in each wave.

7.2.2 Neighborhood composition and mortality

Analyses associated with the ongoing debate regarding either individual socioeconomic status or general neighborhood composition and the level of excess mortality during historical pandemics largely imply that their results are important because they can be used to better understand how this relationship may occur in a similar pandemic today (e.g. [186, 270]).

Due to modern infrastructure and technology in "first world" cities, researchers may argue their findings are particularly relevant in the context of developing countries and urban areas, where conditions may be more similar to those of the European and North American cities studied in 1918. Yet, in these studies, the fact that neighborhood composition in western cities of the early 20^{th} was quite different to their contemporary comparisons. In many historical contexts, rich and poor lived together, or only streets apart, while today, many of the poorest populations today live in urban or peri-urban slums, located far away from middle and upper class in the city center [93, 152, 200].

Certainly, the case of Madrid is not a perfect comparison to contemporary societies. However, the city's rapid growth in the 19^{th} and 20^{th} centuries due to its late start as a capital meant that its geographic distribution of population was different from many other European cities at the time. While selected neighborhoods of the city still featured areas where several different social classes lived together, as noted in the introduction, migrants tended to settle in the same areas, performing equivalent types of employment and overall, experiencing a similar way of life to each other that may have been different from neighborhoods in other parts of the city. Thus, at its root, the results of the neighborhood composition analysis in chapter 5 are likely slightly more relevant to contemporary developing societies and would be therefore more telling of the potential implications of a pandemic today.

7.2.3 Types of analyses to approach research questions

Beyond the subject matter, this thesis also adapted methods innovative to complete each analyses. A wide body of work using secondary and qualitative sources exists about the timing of each wave; newspaper articles can be scoured for a first mention, and old policy records and first-hand accounts can also be looked at as a way to understand the timing of each wave in different geographies. However, the combination of the segmented regression and sequence analysis allowed the progression of the fall wave through Spain to be statistically determined and mapped. Furthermore, mortality baselines appear to be an understudied subject. Rather than accept a baseline that did not fit the unique characteristics of Madrid mortality data, the third chapter explores options beyond the standard methods. This chapter can serve as a guide for others who seek help in modeling seasonality in their data. Finally, while the last chapter provides standard age-specific excess mortality estimates for the Spanish flu outbreaks in Scotland, it proposes a demographic approach to analyzing the change in mortality, better—to demographers—answering the question, ''what did the extra deaths *mean* for the mortality picture at the time?" By creating and decomposing seasonal death tables, the wave-specific change in mortality can be understood in simple terms. Life expectancy went down by between 1 and 14 years, and easily visible by the presented figures, some ages played a larger role in this change than others. These are easy facts for social scientists and non-scientists alike to digest.

7.3 Current Limitations and Future work

Certainly, this thesis provides a wealth of information about different aspects of the Spanish Influenza pandemic, focusing on the city of Madrid. However, no analysis is ever truly finished, and the totality of this work is no deviation from the norm. Several veins of continued research can easily stem from this work, and some will be briefly mentioned here. Moreover, each chapter faced some limitations in terms of the analysis; while most of these were covered directly in the work, they should be broadly re-stated as a whole here.

In any analysis, data issues due to lack of harmonization, missing variables, and poorly collected information can create problems that manifest themselves in incorrect results. These issues are often more present in historical analyses such as this one, when data was transcribed by pen and paper, then digitized again decades later by others into an electronic database. Moreover, due to the required time and exertion to collect this information, as well as the lack of computation power statisticians have today, the overall richness of historical data can seem less so than contemporary sources. All this inevitably leads to difficulties in choosing methodologies and cleaning the data for analysis. Nonetheless, without this careful work, the contributions presented in historical analyses, such as those presented here, would not be able to contribute to our understanding of today's society.

Thus, the statistical and methodological power of this thesis could certainly be improved through better geographic data or more individual level information. However, each chapter was proposed, planned, analyzed, and re-calculated many times, ensuring that the results presented here accurately represent and correctly answer the questions that led to their formulation. Moreover, this dissertation has attempted to supplement the landmark work Beatriz Echeverri and María Isabel Porras Gallo have completed on the history of the Spanish Influenza in Madrid and Spain. Rather than duplicating or recreating their research, I undertook a more methodological and pure demographic approach to the analysis of this pandemic.

7.4 Influenza research: combining the past, present, and future

7.4.1 Long term effects of influenza exposure?

While this thesis has focused primarily on quantifying the mortality effects *during* the influenza outbreaks in 1918 and their associated successive waves, another vein of recent research attempts to look beyond the short term consequences of the events and instead focus on the potential long-term ramifications of exposure to the virus. In a sense, these studies use the Spanish flu as a natural experiment to test the fetal origins and developmental origins of health and disease hypotheses, which argue that conditions both in the womb and in the time immediately following birth can impact later life outcomes [20, 30, 31]. Generally, these analyses compare the achievements of cohorts born before, during, and after the pandemic to assess how in-utero or early life exposure to the influenza virus in 1918 may have impacted overall health and socioeconomic status.

Several geographic-specific studies indicate that a fetus or infant's later-life outcomes may in fact have been limited by influenza exposure. In Switzerland, even when controlling for the ferocity of flu outbreaks by region, males born in 1919 achieved lower levels of education and married less than those cohorts born before and after the pandemic [188]. Additional separate studies in Thailand, Brazil, Sweden, and the United States mirrored the aforementioned results, finding further evidence to support that cohorts born following in-utero and/or infant exposure to the virus faced adverse socioeconomic life outcomes, potentially directly linked to the pandemic outbreaks [19, 154, 190, 234].

These effects have not been limited to socioeconomic outcomes. The aforementioned study focusing on Thailand also found a higher likelihood of chronic health issues in old age [154]. One study in the United States found that those born in 1919 not only had poorer self reported health but were also more likely to have functional limitations than in the cohorts born between 1915 and 1918 and 1920 and 1923 [21]. Another United States base study found that those with in-utero or infant exposure to the virus were subject to much higher rates of cardiovascular disease between the ages of 60 and 82 and that these same cohorts were noticeably shorter than those born in the surrounding years according to World War II enlistment records [170]. In Sweden, morbidity, approximated by hospitalizations (and duration of stays) was heightened, and mortality due to cancer and heart disease was slightly higher in males with in-utero exposure [131].

Yet, the debate regarding long-term socioeconomic impacts due to exposure is still ongoing. For example, the analyses in Sweden that found some poorer health outcomes among those who faced exposure to the virus in-utero failed to find significant evidence of differences in socioeconomic measurements between pre-, during-, and post- flu cohorts [131]. Moreover, a global-level study used more than one hundred International IPUMS data sets in an attempt to identify an distinct patterns regarding long-term individual effects from in-utero and early life exposure to the virus [289]. Though the study primarily focuses on only the second wave of the pandemic in the fall of 1918, it fails to find a singular universal trend in later life health and socioeconomic outcomes in the 1919 cohort. Moreover, some data sets analyzed revealed opposite effects for individual outcomes, and these further varied by geographic region. Despite the difficulties in harmonizing the data used, accounting for unobserved heterogeneity, and dealing with data quality and collection, the study is important in that it highlights the possibility of geographic differences in these long-term effects to individual in-utero and early life exposure. As research on the Spanish flu pandemic continues, this question has yet to be definitively answered and ultimately may provide insight into lasting impacts on populations in the wake of future pandemics.

7.4.2 Subsequent pandemics

Though to date, nothing has come close in terms of morbidity or mortality impact to the Spanish flu, additional pandemics have occurred in the one hundred years following the outbreaks in 1918. Flu pandemics in 1957, 1968, and 2009 all caused an increased amount of excess mortality throughout the world, though these levels produced excess mortality at much lower rates than the 1918 pandemic. While the overall mortality impact was lower, these viruses may have had similar virulence and attack rates to 1918 [297]. This implies much progress in treatment and containment has been made. In fact, while their effectiveness can still be vastly improved, several antiviral medications are available for use, and they continued to be improved [13].

1957 Asian Flu

In 1957, a virus later confirmed to be H2N2 in nature appeared, for the first time in humans, in Asia. As the virus spread through the world, it similarly affected, though to a lesser degree, younger adults at higher levels than seasonal flu [251]. In the United States, the flu had, after the 1918 pandemic, the second highest excess death rates of the 20^{th} century [254]. Also similar to the 1918 pandemic, those with the flu often also became ill with pneumonia, and in addition, those with heart and lung disease became particularly susceptible to infection and death [144]. However, due to increased immunity within the population from exposure and the introduction of effective vaccines, the strain disappeared slightly more than one decade after the initial outbreaks.

1968 Hong Kong Flu

After being called to western attention via an outbreak in Hong Kong, a new influenza outbreak spread to Japan and eastward to the west coast of the United States in 1968-69 [144]. The strain was identified as H3N2, which, due to the N2 similarity to the earlier Asian Influenza pandemic, may have provided some small protection in a part of the population [285]. Overall, the totality of this pandemic was much lower than that of the 1957 outbreaks [254]. Initially, outbreaks in Japan and the United Kingdom were less deadly, but in the United States, both morbidity and mortality rates were high [144]. However, in subsequent outbreaks, higher death rates did occur. The variation in the severity is still notable, and the virus remains in circulation; while endemic, the virus still produces high levels of hospitalizations in years which the strain is prevalent [7].

7.4.3 2009 Pandemic H1N1/09 Virus

Over forty years after the beginning of the 1968 outbreaks, a new strain of H1N1 influenza was identified after causing a large number of infections and increased mortality in North America, particularly in Mexico [104]. Ultimately, the disease, initially dubbed ”Swine Flu," spread around the world and was believed to have caused around 18,500 lab confirmed deaths in over 200 countries one year after the initial outbreaks, though the total number of excess deaths is estimated to be at least over 200,000 [86]. The largest mortality burden is believed to haven been in developing areas without reliable data. While, as in any pandemic, the great loss of life is tragic, what is perhaps most important as a result of this outbreak is the level of research interest measured via scientific publications on the virus and the manifestation and impact of the pandemic [57].

As they have in the past, influenza viruses will continue to mutate through antigenic shift and drift and jump between avian, swine, and human hosts, meaning that the next global pandemic is never so far away. More recently, viruses such as an influenza A avian strain of H7N9 have produced epidemics in China over the last several years [145]. However, with continued interest of researchers, the world can contain and prevent future outbreaks through better understanding of how epidemics manifest themselves.

7.4.4 Improvements from 1918

During the 1918 pandemic, due to both a lack of infrastructure and technology and understanding of the disease, proper care for those who fell ill was rare. In countries participating in the war, medical doctors were scarce, and thus most treatment regimens were meant to ease pain and discomfort [46, 66]. In these countries, but also in neutral ones such as Spain with a fully intact medical force, technology simply did not provide the means to properly treat the impacted, as antibiotics and antivirals had yet to be invented [102]. At the time, other attempts to treat the ill, such as the introduction of fluids from a post-infection individual to a currently infected one, or an attempt to abate the secondary infections, were both limited in use and overall effectiveness [6, 157].

Even in the years directly following the outbreaks, attempts were already beginning to lay the foundation for government led prevention plans; in Spain, several parliamentary measures were proposed in 1919 [111]. In the summer of 1919, the Spanish government put into effect many health reforms, including the creation of a provisional “Dirección General de Sanidad," which placed doctors under the supervision of the municipal health inspectors and paid them directly by the state. Additionally, health brigades, epidemic hospitals, and other specialized medical centers would be created and run by public funds in an effort to better control widespread infectious and other diseases [1, 2, 3, 5, 114].

Today, the scientific and medical communities have progressed far from their knowledge of 100 years ago [139]. Yearly, new vaccinations are created and provide immunity to some strains, and it is recommended that several subgroups of the population most susceptible to outbreaks, such as the elderly, are inoculated each year [216]. These vaccines are created with the idea of providing immunity to emerging viruses with the potential to cause the largest amount of damage. Protocols, such as the CDC’s Influenza Risk Assessment Tool, guide experts to provide the best outcome for overall public health in the creation, dissemination, and execution of vaccines and preparedness plans [174]. Furthermore, scientists work tirelessly to create these new vaccines that keep up with new viruses so that the spread of new, virulent strains of influenza, can be contained and human lives saved, and a universal vaccine one day become reality [98]. More than that, the process of testing for and identifying influenza viruses in tissue has become faster and provides more detail [12, 103].

The role of surveillance also plays a large part in the understanding and identification of new influenza sub types and their spread to and between humans. The Centers for Disease Control in the United States has begun a large program to improve analyses in partner countries around the world [212]. Additional international agencies also work together to improve surveillance and prevention throughout the world. The World Health Organization, has several affiliated laboratories around the world that test samples for new strains, and requires that human infections by new influenza A subtypes be reported immediately, so that officials can be made aware and prepare for any potential epidemics [11, 201]. Together, these organizations, along with wildlife and nature agencies, collect and analyze data sources, both biological (tissue specimens) and in more general terms such as hospital admissions, etc. in order to be aware of any slight deviation from seasonal flu behavior [8, 264]. In Spain, the Carlos III Health Institute (Instituto de Salud Carlos III) is the main body in charge of collecting and monitoring influenza tissue and surveillance data throughout the country [9].

But policy makers must also consider the warnings and knowledge of social epidemiologists and scientists in the larger plans of epidemic preparedness. While surveillance data continues to increase in both detail and geographic area covered, many areas, especially in lower income and high mortality countries, lack the same standards of data collection. Should the results of this thesis and other analyses be believed, these areas are likely to experience particularly high excess mortality should another pandemic strike. In this way, the work of social scientists and epidemiologists to understand past pandemics can call attention to areas where modern surveillance technology lacks.

In another regard, in 1918, many places in the U.S. attempted to quell the transmission through school and other closures, quarantines, and canceling large public gatherings [165]. Continued research in this area has attempted to quantify how, and to what extent, public interventions, such as school closures, may prevent the spread of influenza in the future using data from past pandemics [291]. These policies continue to be implemented today, such as when schools were closed in Mexico during the 2009 influenza outbreaks [165]. The analyses of this impact on overall transmission and outbreak containment by epidemiologists and social scientists can provide additional details into the interaction of population characteristics and the mechanisms of influenza spread and containment.

Considering the vast medical, policy, and epidemiological improvements in the last one hundred years, it seems less likely than before that a pandemic will hit the world in the same manner as the Spanish flu. However, that means that neither the potential for such a pandemic is impossible nor that researchers should end their work on this past great pandemic. There remains work to be done in prevention and treatment, surveillance, particularly in lower income areas, and more than anything, research should continue to disentangle and highlight heightened mortality in disadvantaged populations [286]. Just as influenza strains continue to mutate and evolve, as researchers, our perspective on not only the 1918 influenza and other historical outbreaks, but also on the potential for future pandemics, should also continue to progress.

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Appendix A

Additional Material: Chapter 1

Before starting a formal analysis, it is necessary to employ smoothing techniques in the data for several reasons. First, the pandemic occurred during a period of large mortality decline in much of the world [53, 73], so baseline mortality rates in 1917 may not accurately reflect the expected mortality in 1918. Secondly, the Human Mortality Database recommends using smoothing techniques in single-age data in some countries (i.e. Spain) due to a prevalence of age-heaping and/or other quality issues [295]. Thus, using the Mort2Dsmooth function of the MortalitySmooth package, the mortality rates from 1908-1917, the ten year range before the flu outbreak, are smoothed, and the 1917 smoothed rates are used as the m_x values in 1917 to smooth the data across ages and years using P-splines [47]. An example of actual (left) and fitted (right) log mortality rates for Spanish males is found in figure A.1.

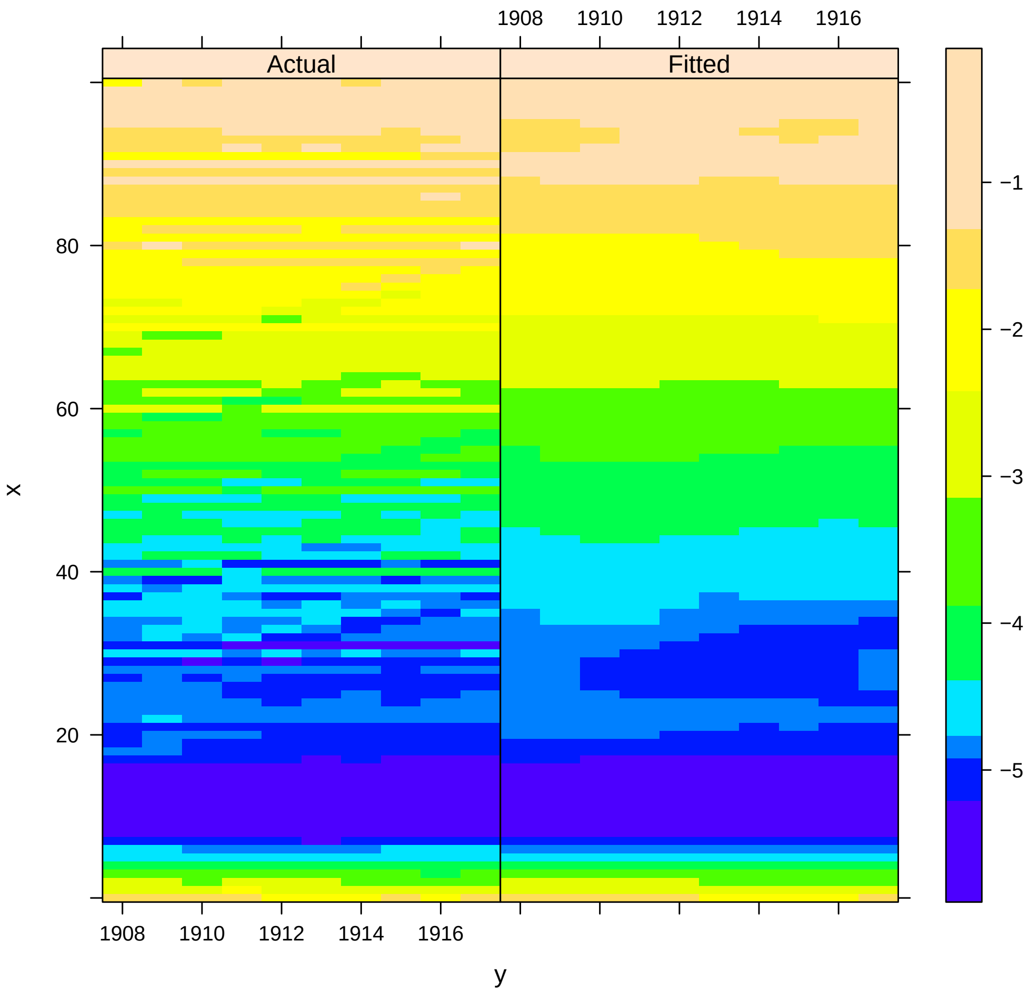


Fig. A.1 Real and smoothed mortality rates 1908-1919, Spanish Males

Separately, one-dimensional (Mort1Dsmooth) smoothing is applied to the actual 1918 deaths in the Human Mortality Database (HMD) to account for the data issues mentioned above. These smoothed rates provide a clearer idea of the continuous pattern of age-specific rates during 1918. From the smoothed ten year interval, expected mortality rates in 1918 are extrapolated. Based on the two-dimensional smoothing that incorporates both age-specific and declining mortality trends during the time preceding the outbreaks, the extrapolated rates give an estimate of expected mortality in 1918 based on the mortality patterns of the 10 years preceding the pandemic.

A.1 Contour decomposition

Likely, the role of the pandemic is underestimated across ages, as general trends in mortality decline may hide additional impact of the outbreaks, both overall and in individual age groups. That is, without the flu, age-specific mortality rates in 1918 were likely to *lower* than in 1917 due to the drastic improvement in mortality rates during the time [53, 73, 226]. Using the smoothed mortality rates in 1917 and 1918 as well as the expected (extrapolated) rates of 1918, a life table contour decomposition technique was adapted to discern how longitudinal mortality trends and the heightened total mortality in 1918 (due to influenza) each played a role in two life table measures, life expectancy (e_0) and e-dagger ($e_x^\dagger$).

The contour decomposition approach disentangles the final mortality differences between two populations by initial and trend (temporal changes) differences [138]. The approach normally follows a step-wise approach by first moving from population 1, time 1 to population 2, time 1, followed by the change to population 2 in time 2 and finally population 1 in time 2 (for example, [25]. These steps produce vectors with age-specific contributions (for each age or age-group in the population) that identify to the group or stage difference in mortality. When all the vectors are combined (1+2-3), the resulting set of values equals the age-specific mortality differences between the two populations in the last period of observation.

However, because this decomposition looks at only one population, the contour approach is simplified such that:

$$Mortality_{smoothed1917} \rightarrow Mortality_{extrapolated1918} \rightarrow Mortality_{actual.smoothed1918}$$

By using step-wise decomposition between these three vectors, the final result provides both the age-specific expected contribution of a measure's trend over time towards the total change in 1917 to 1918 mortality *and* the absolute differences between the mortality in 1918 and what was expected. Effectively, the vector of age-specific contributions to life expectancy and e-dagger change between the extrapolated 1918 rates and the actual 1918 rates will show the total contribution of the Spanish flu to age-specific mortality change in 1918, despite the expected decline due of the overall decreasing trend.

As with normal step-wise decomposition, the contour decomposition requires the recalculation of the decomposed measurement to be decomposed step-wise at each age interval [138]. The modified contour decomposition function is preformed to examine the change in both life expectancy and e-dagger in 1917 and 1918 among males and females for the available countries in the HMD.

As noted in the introduction, aggregate (smoothed) life expectancy at birth in 1917 was 42.03 and the extrapolated life expectancy in 1918 was 41.70. Notably, in a time of generally declining mortality in Europe, the life expectancy (perhaps due to changing population distribution by age, though not a part of this analysis) in Spain was expected to decrease slightly in 1918 given the smoothed trends in age-specific mortality from 1908 to 1917. Despite this expected value, real life expectancy of Spanish males was only 30.02 in 1918.

With the above total differences in average life expectancy in mind, the decomposition helps to understand how each age group contributed temporally and absolutely to the total change between 1917 and 1918. First, an R function is adapted and applied to smooth and extract the necessary information for the decomposition function. The function is run one time for each country in the HMD for which there is data and places the information into a list with one element, or dataframe, for each country. This list will be used to call the necessary vectors when running the decomposition.

This list of mortality vectors is then used to find age specific contributions to the trend and absolute change in life expectancy and e-dagger from expected values in 1918 using the decomposition. The results are those mentioned in section 1.4.3 and displayed in figures A.2, A.3, A.4 and A.5 below.

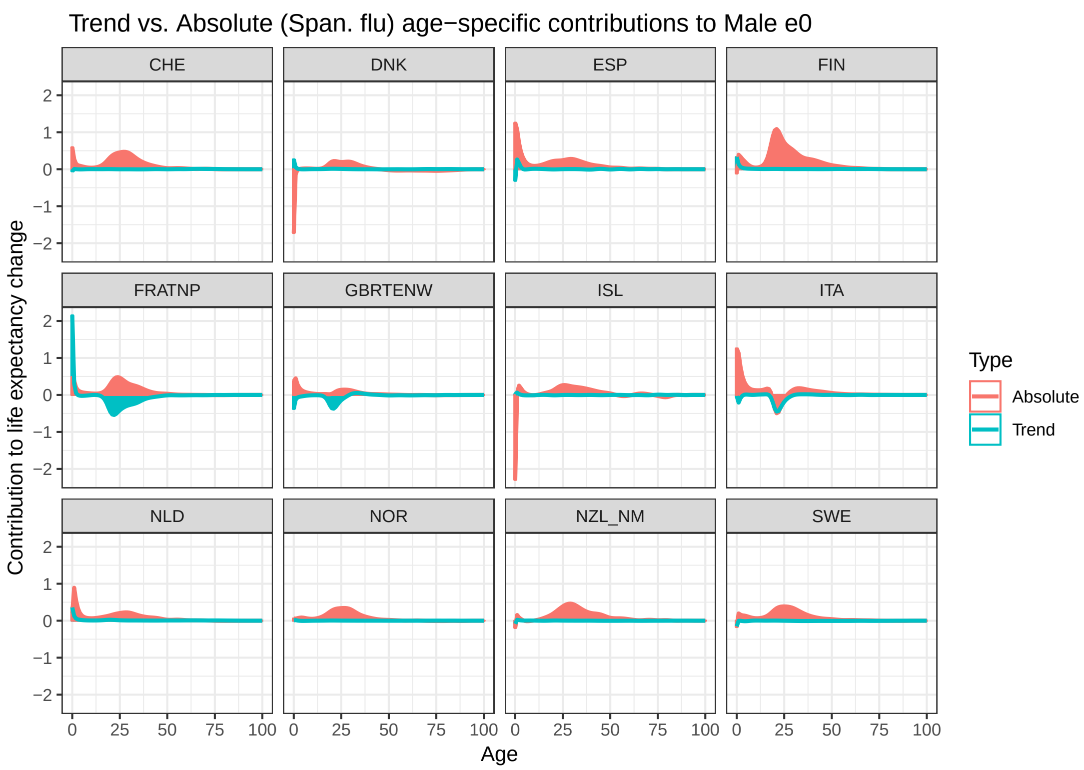


Fig. A.2 Contour Decomposition for Life Expectancy of Males in Selected European Countries

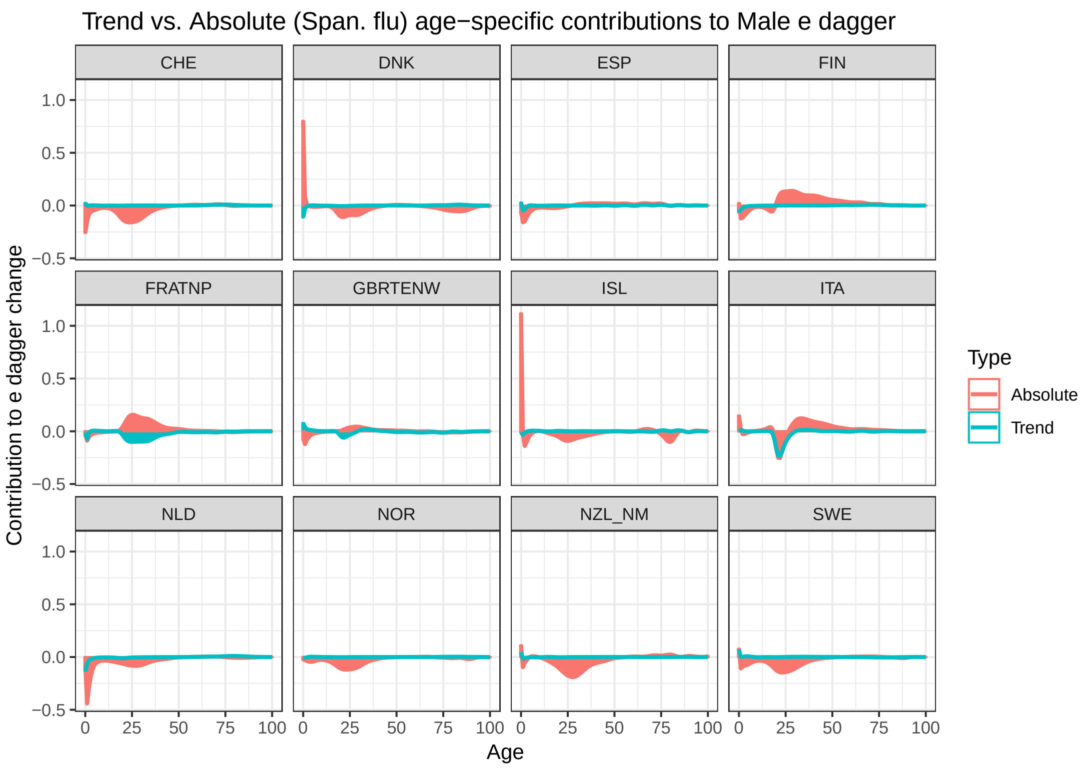


Fig. A.3 Contour Decomposition for E Dagger of Males in Selected European Countries

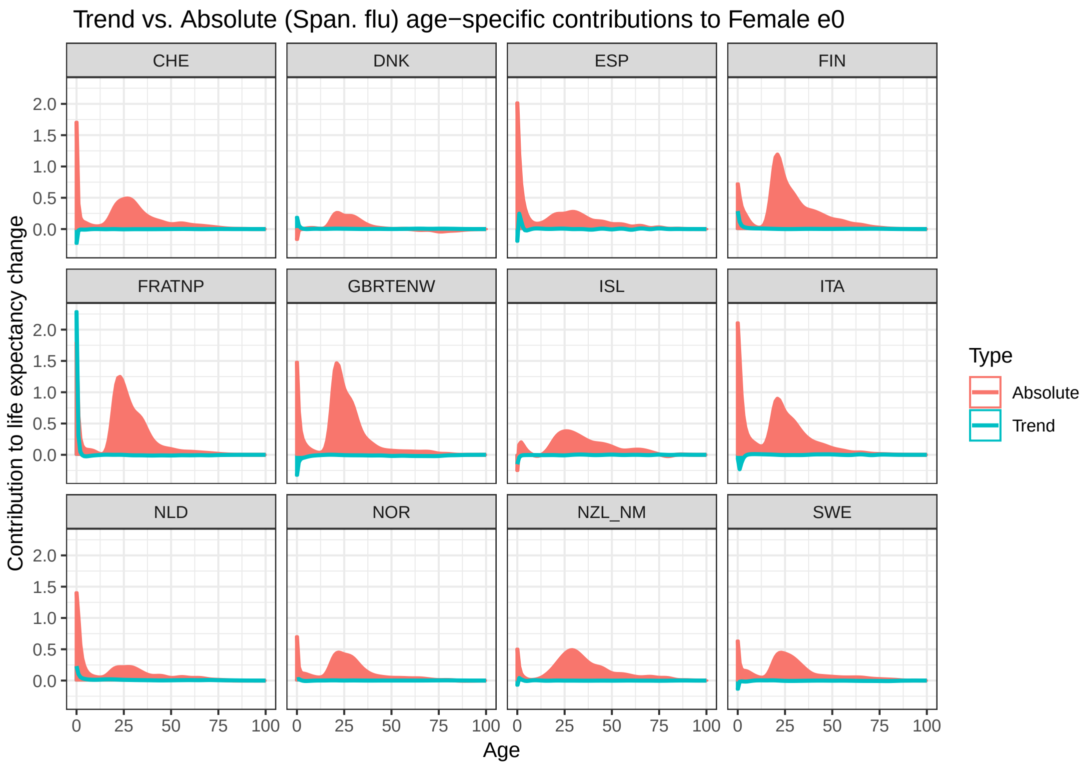


Fig. A.4 Contour Decomposition for Life Expectancy of Females in Selected European Countries

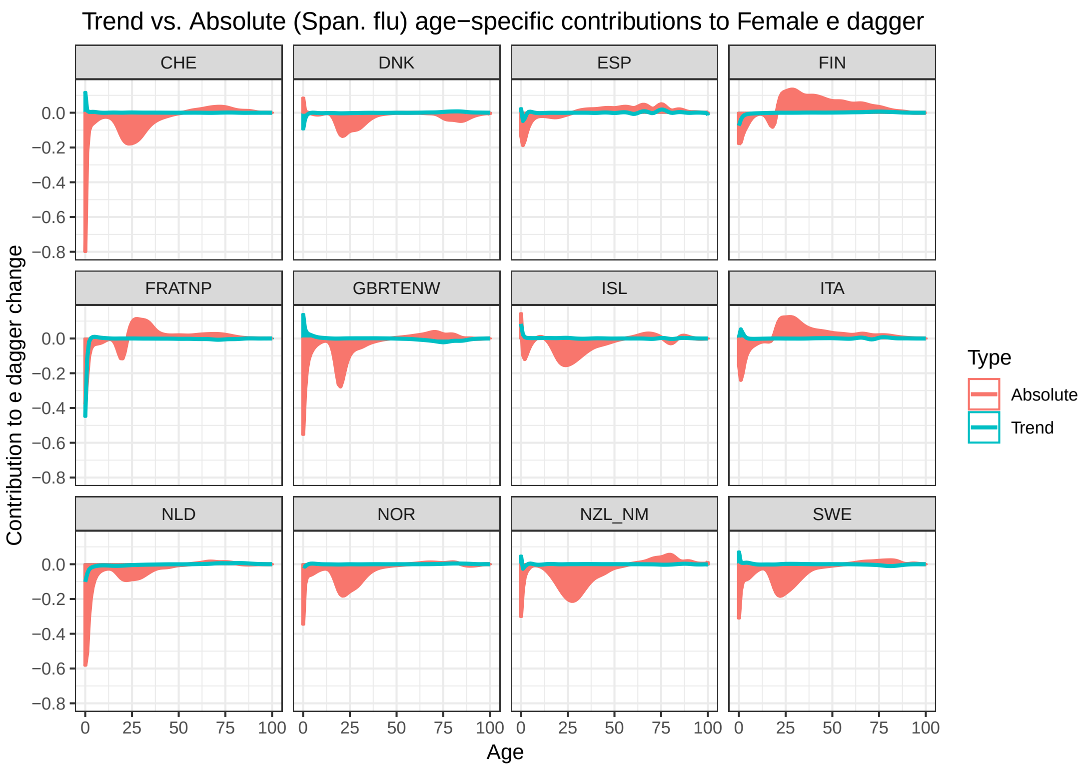


Fig. A.5 Contour Decomposition for E Dagger of Females in Selected European Countries

Appendix B

Additional Material: Chapter 2

B.1 Sequence Analysis Results

This section shows graphically the results of the sequence analysis by total province, their capitals, and remaining populations. The first graph shows the time spent in each state (a) Pre-epidemic period, b) Ascending phase of the epidemic, c) Descending phase of the epidemic, and d) period following the epidemic). Note that the totality of the epidemic could not be estimated in some geographic locales and that in some capital cities, no epidemic could be statistically determined.

The following two figures for each geographic region show the time spent in each state according to the typology used (either the Chi2, which found three optimal groups, of the Euclidean Distance method, which found five optimal groupings). The final image looks only at the optimal groupings according to the Euclidean distance measure, showing, for each identified group, the total amount of time spent in each grouping.

B.1.1 Provinces

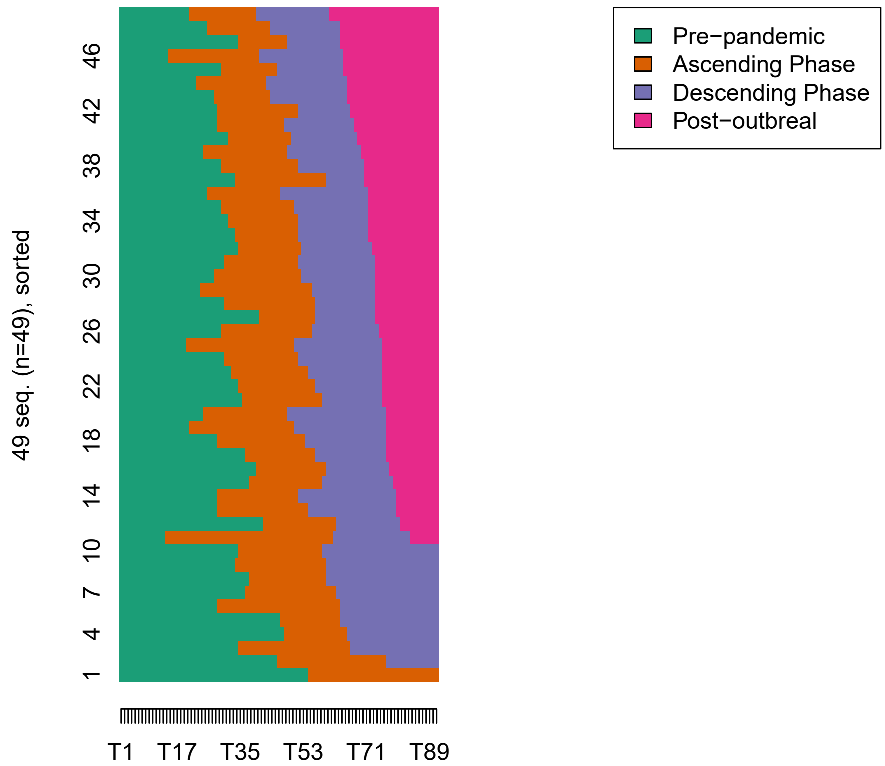


Fig. B.1 Time spent in each state, provinces

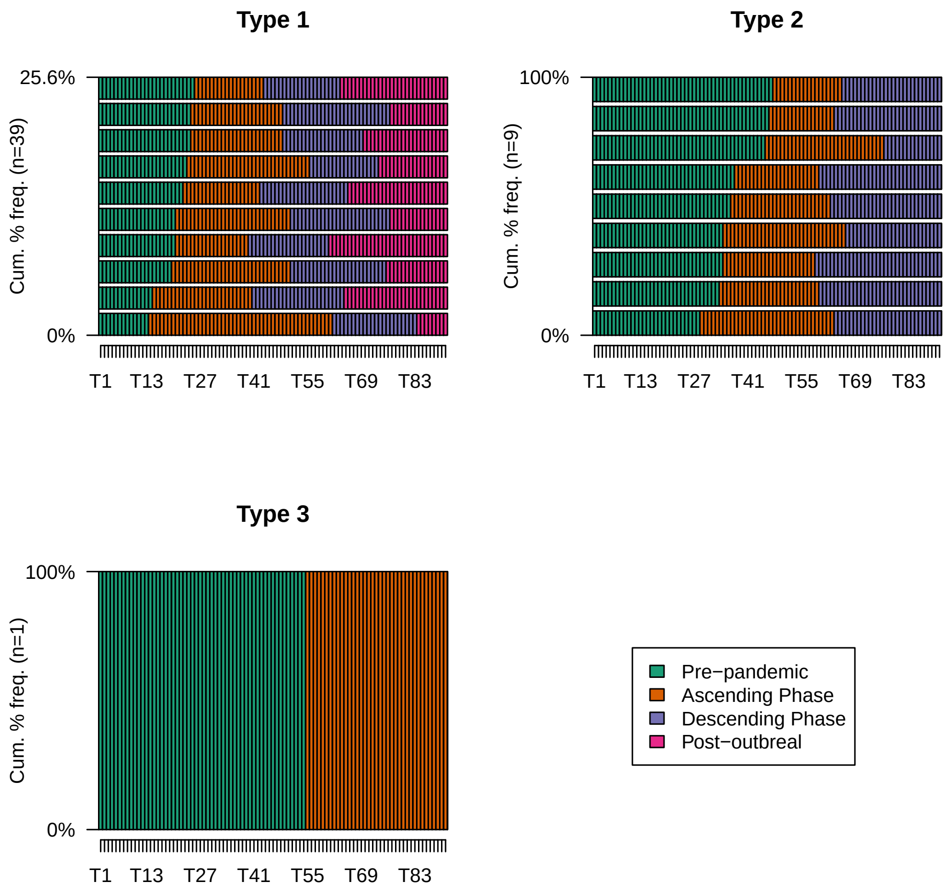


Fig. B.2 Time spent in each state by province and grouping (three groupings, Chi 2).

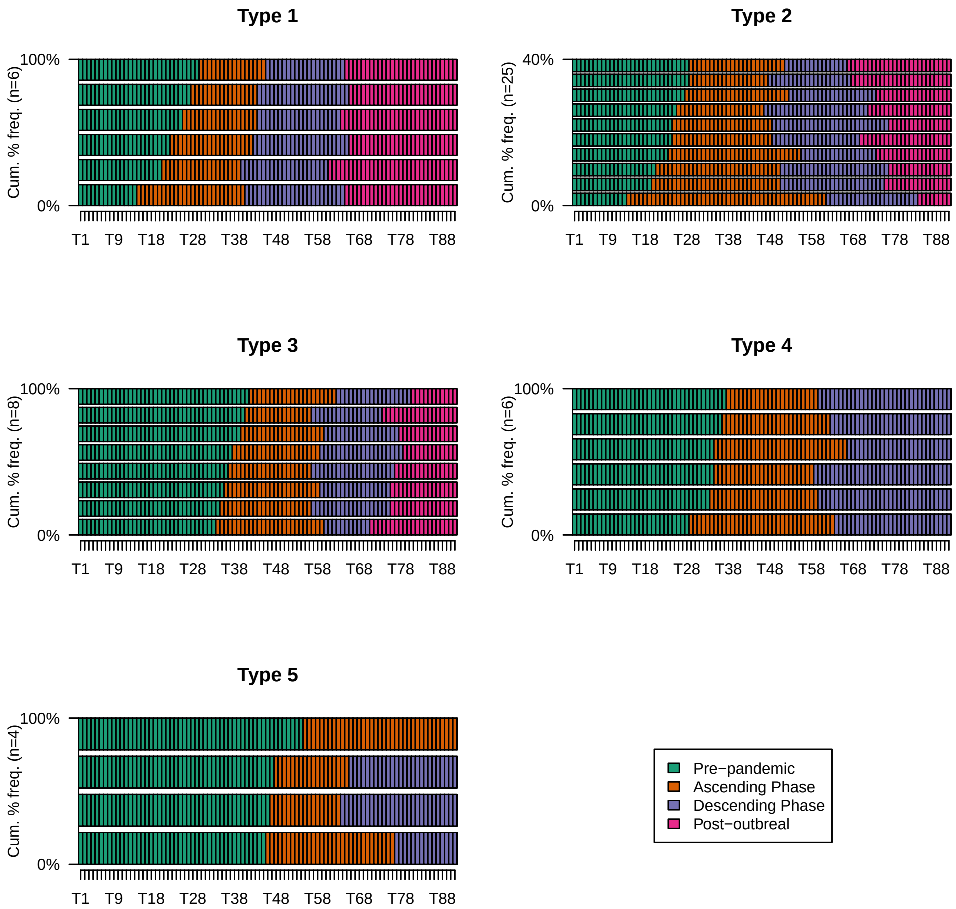


Fig. B.3 Time spent in each state by province and grouping (five groupings, Euclidean Distance).

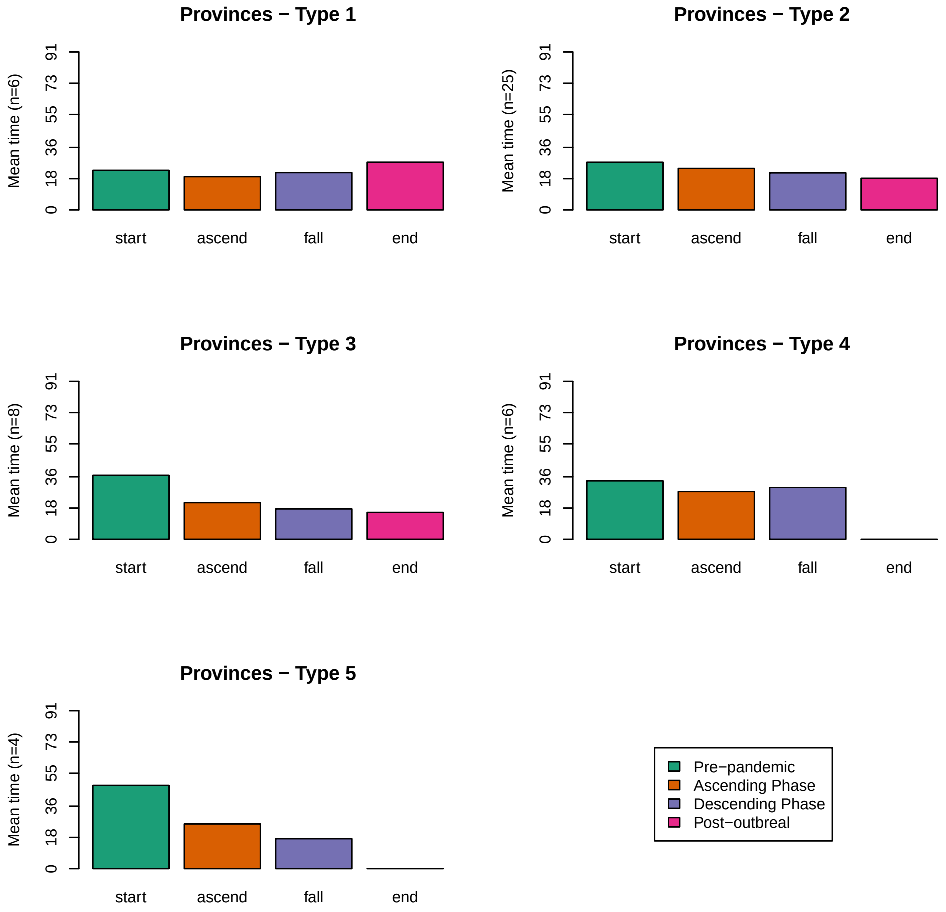


Fig. B.4 Total time spent in each state for each grouping, provinces.

B.1.2 Capital Cities

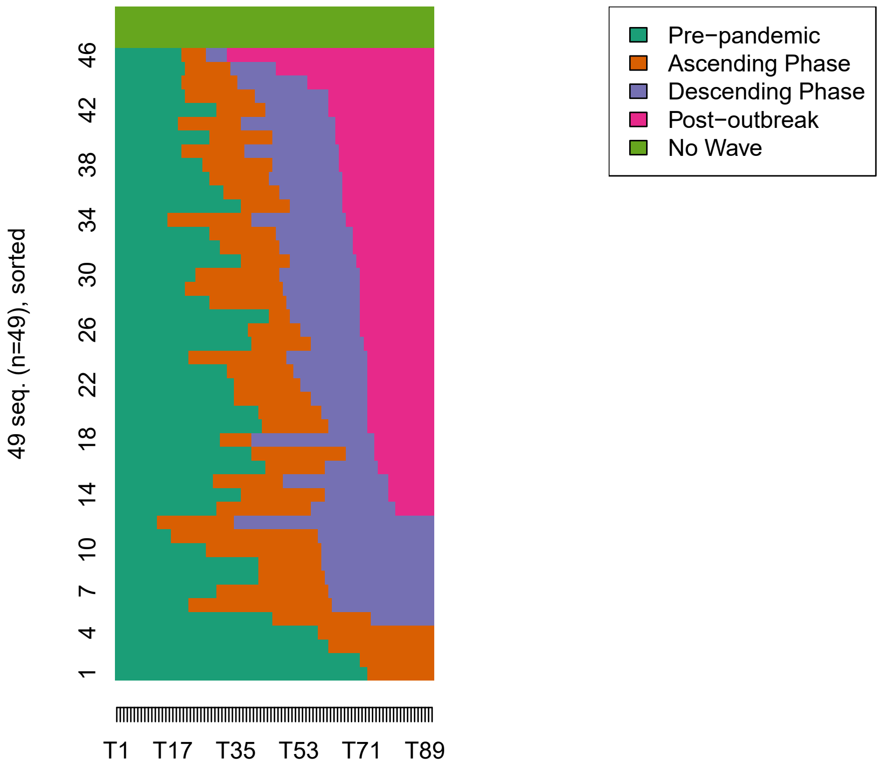


Fig. B.5 Time spent in each state, capital cities

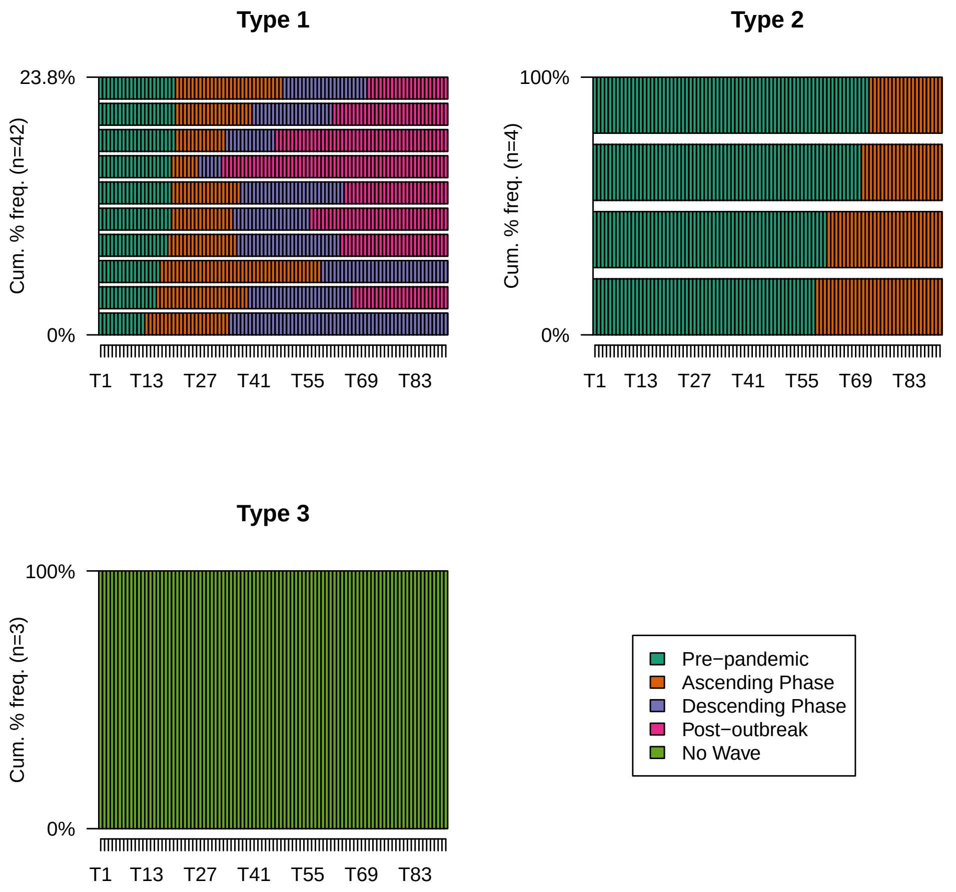


Fig. B.6 Time spent in each state by capital city and grouping (three groupings, Chi 2).

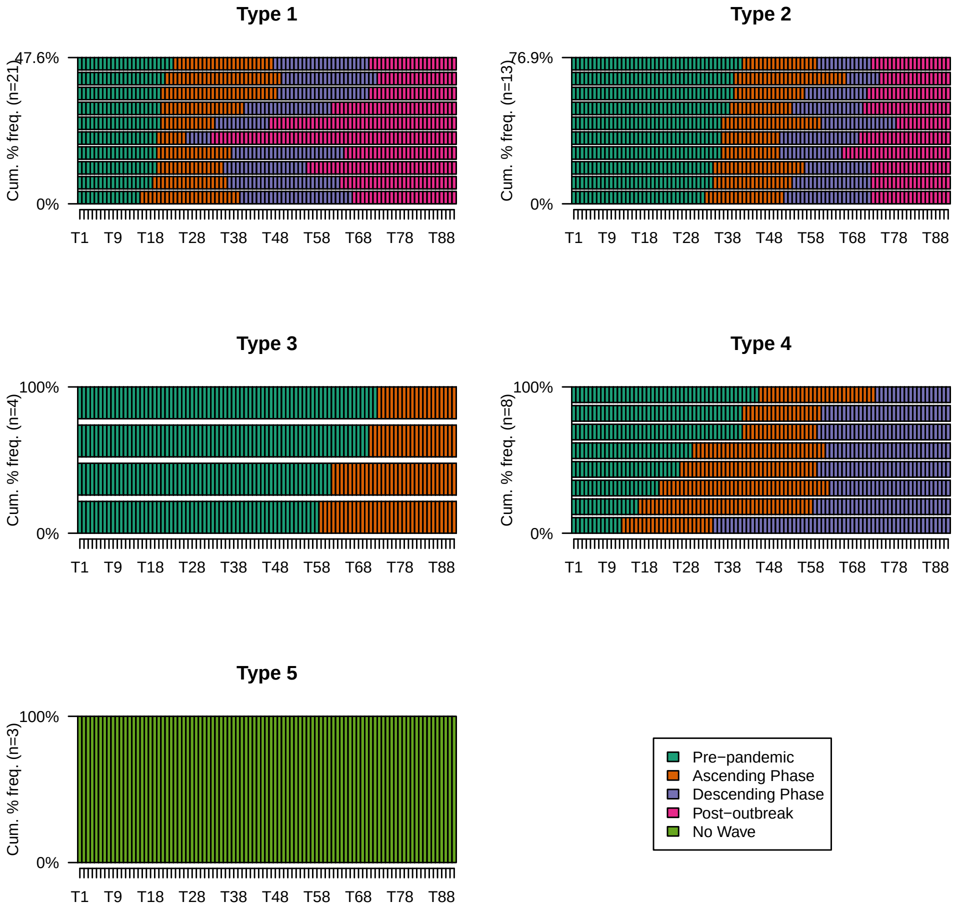


Fig. B.7 Time spent in each state by capital city and grouping (five groupings, Euclidean Distance).

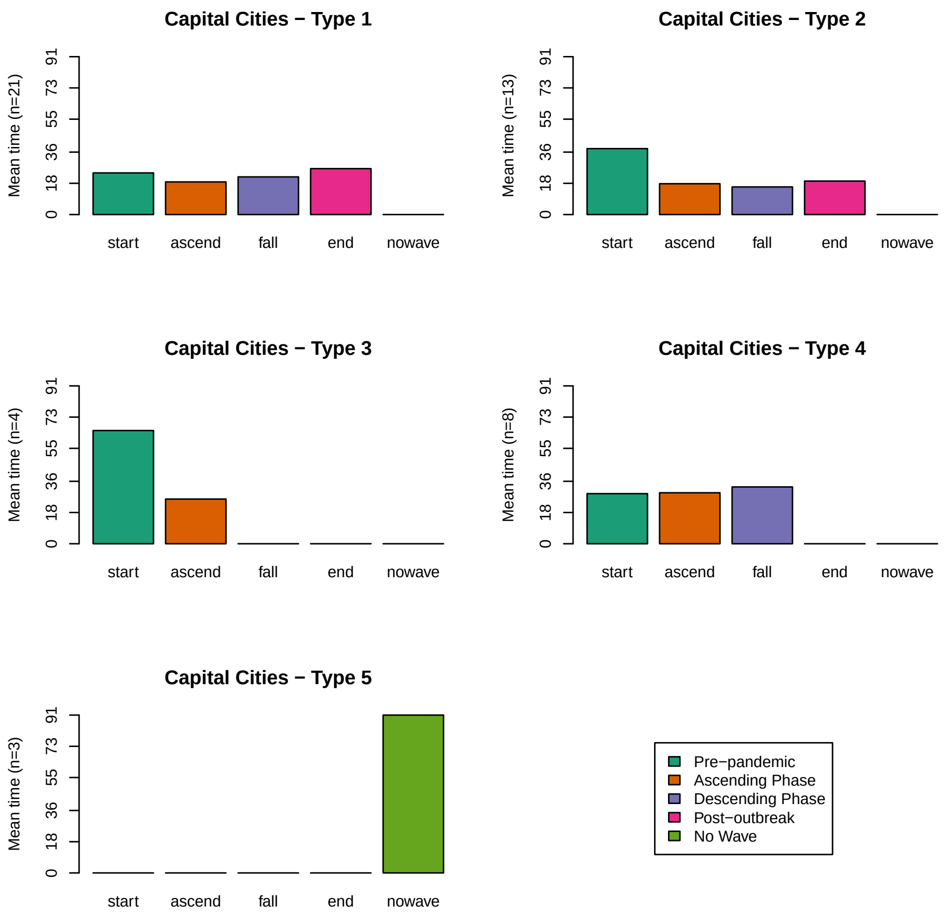


Fig. B.8 Total time spent in each state for each grouping, capital cities.

B.1.3 Rural Areas

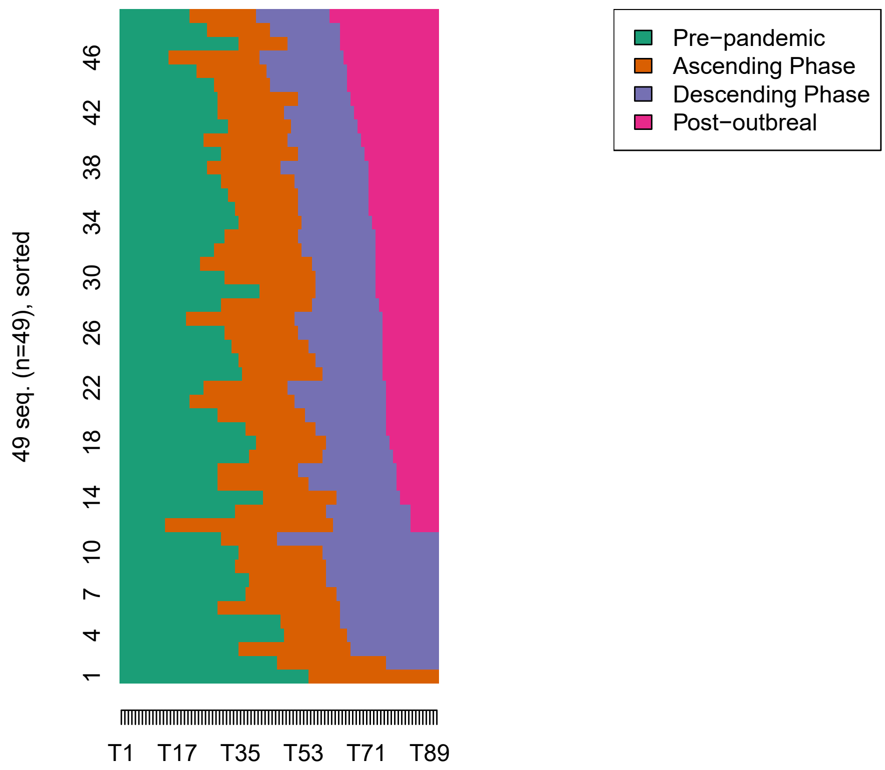


Fig. B.9 Time spent in each state, rural areas

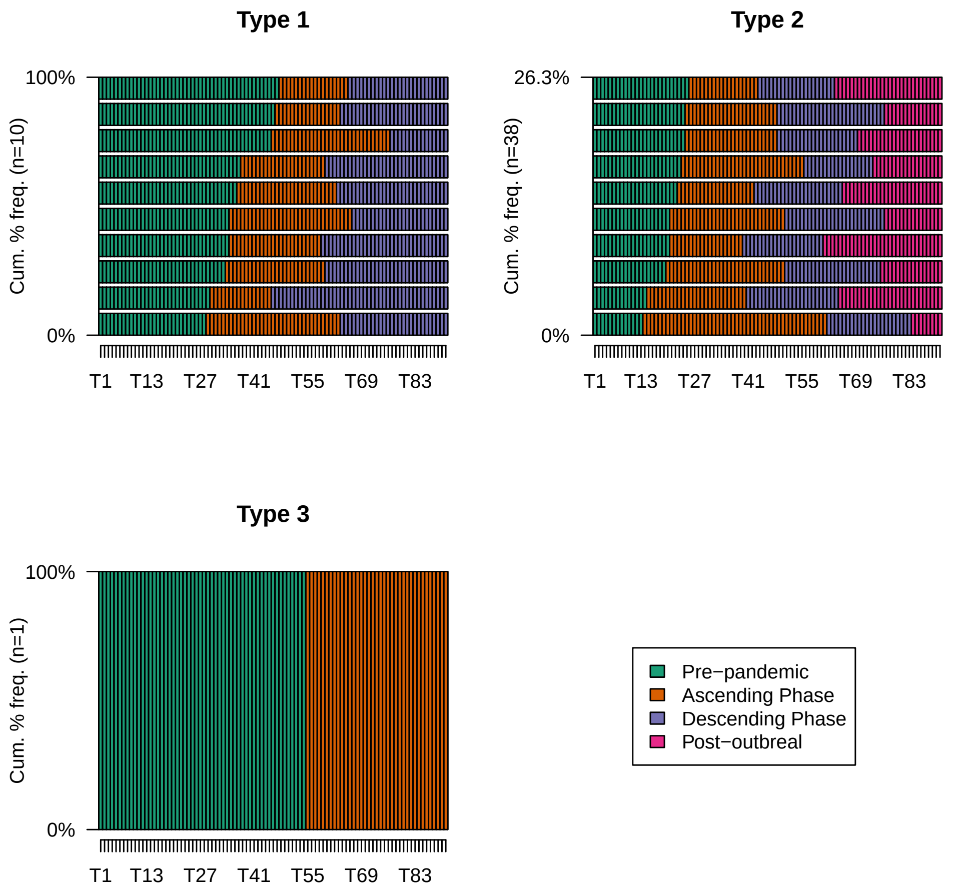


Fig. B.10 Time spent in each state by provincial rural area and grouping (three groupings, Chi 2).

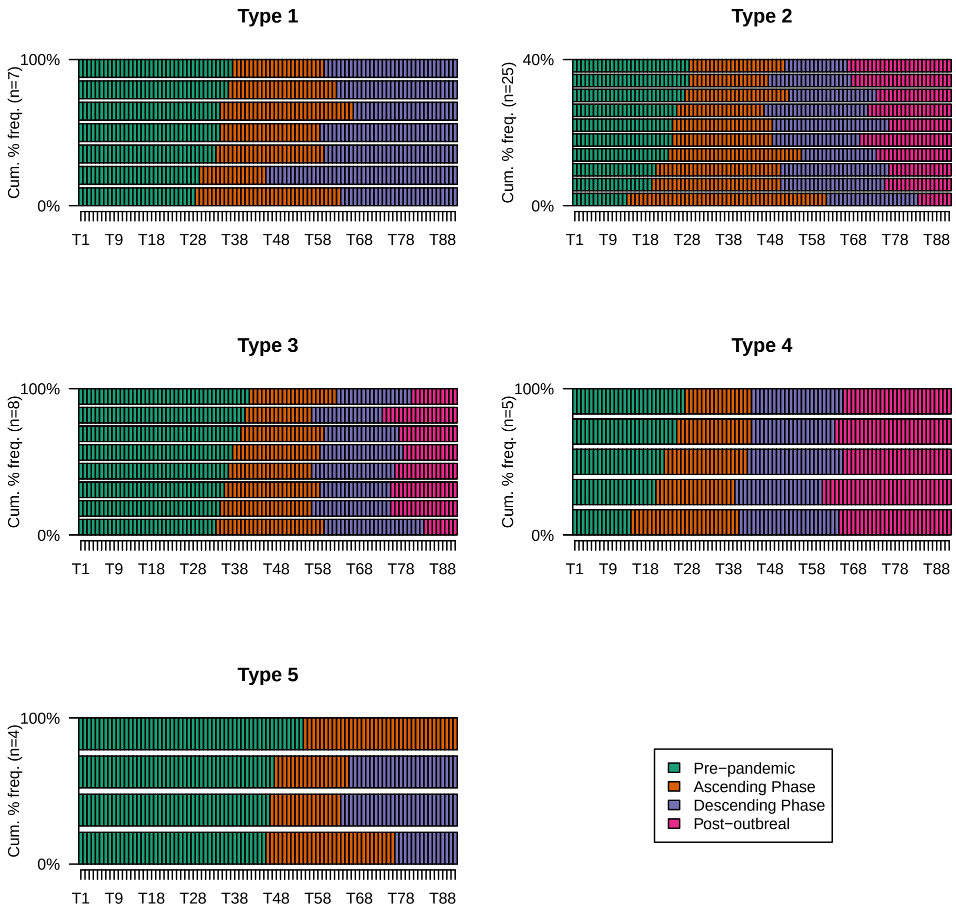


Fig. B.11 Time spent in each state by provincial rural area and grouping (five groupings, Euclidean Distance).

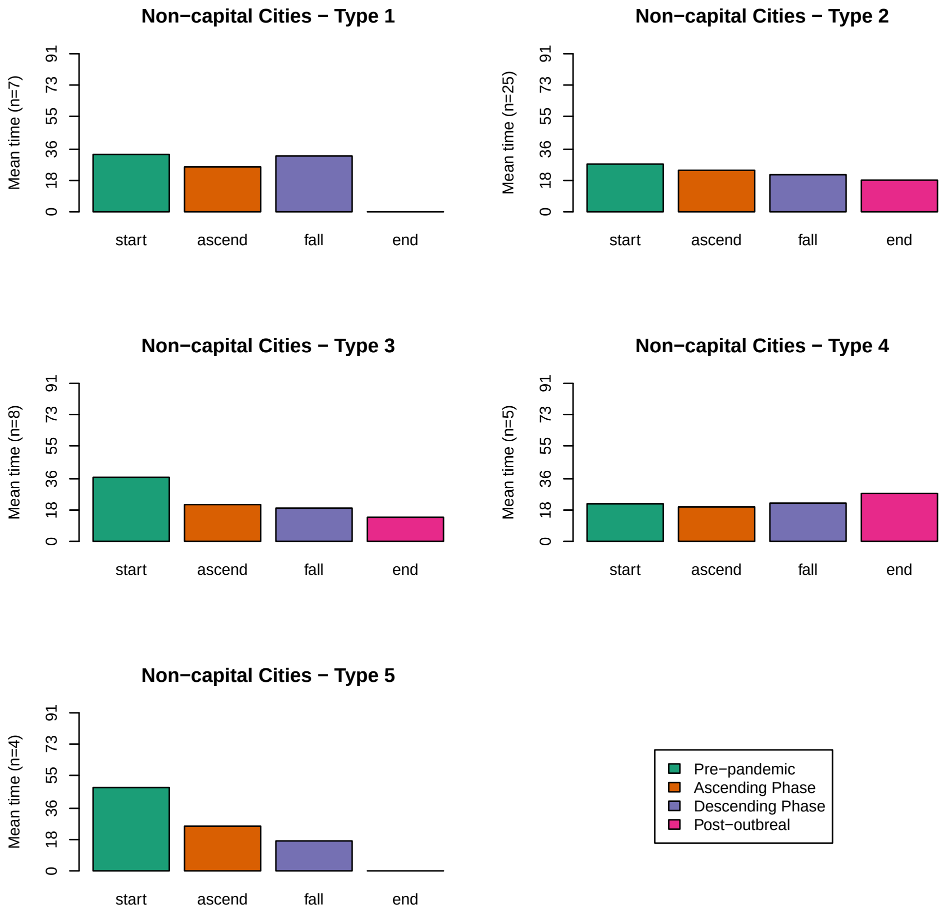


Fig. B.12 Total time spent in each state for each grouping, rural areas.

Appendix C

Additional Material: Chapter 4

C.1 Examining causes of death in the data

Here, visual graphics depict the change in number of deaths by cause and age during the first three waves of the Spanish Influenza Pandemic in Madrid.[1] Because mortality to influenza is often attributed to different causes of deaths, including not only respiratory related illnesses, it is important to consider how all causes of death change from the baseline period of mortality to during the epidemic wave. When comparing these causes as a time series, even more information can be revealed as to whether or not the increase is related to the wave. That is to say, visual tests can reveal whether the changes in cause of death during the total wave period correspond to the timing of the wave.

Causes of death were examined according to both the ICD-1 ("CM" coding) and another method which was developed to account for causes in Spanish parish and civil death records at the time using modified classifications from McKeown and Bertillon [39, 173, 183]. The results were extremely similar. Most figures here are presented according to "cc coding," which is helpful to understanding the exact causes of death associated with the pandemic. This is because the "cc coding" is based on four numbers, or chapters, that correspond to individual causes of death, while the "CM coding" contains only two numbers, that of one broad chapter and one more specific grouping. While the text and figures denote the causes of death according to the coded numbers, below is a table that contains information regarding the general causes of death associated with the number.

[1] In each figure presented, some of the causes of death are blank for each age group, in all figure types. In the case of the time-series by cause of death for age groups, this is due to only one point of data being available within the graph. That is to say, a time-series of points could not be created with a single point of data. In the case of the gross and percentage difference by cause of death, the causes listed but with no change in number or percent are due to deaths occurring both pre- and during the wave period, but no differences in the total number of deaths during this time.

Table C.1 Cause of death according to “cc" code

Numerical Code	General Causes of Death
1.2.0.0	Flu-specific related: “Grippal" bronchitis, Pneumonia, Erysipelas
1.2.1.1	Smallpox
1.2.2.1	Tuberculosis, Asthma
1.2.2.0	Bronchitis, Broncopneumonia, Pneumonia
1.2.2.1	Tuberculosis related
1.4.2.0	Meningitis, Encephalitis
2.3.0.0	Diabetes, Poison/toxic stuff, Cardiac arrest
2.4.0.0	Eclampsia, Effusion, Cerebral softening of the brain
2.12.0.0	Congenital defects, extremely poor health at birth

C.1.1 Herald Wave

Figures C.1, C.2, C.3, C.4, and C.5 show, by age group, differences in number of deaths by week for the period in 1917 corresponding to the herald wave as well as during the actual wave in 1918. In the herald wave, several causes of death have noticeable changes among the youngest ages. 2.3.0.0, 1.2.2.0, and 1.4.2.0 appear to have significantly higher deaths, corresponding with the rise, peak, and fall of the herald wave. 2.3.0.0 also appears to contain the same pattern, and these deaths were not present in the year before. For several other causes, there appear to be a slightly greater number of deaths during the flu than in the year before, though to a lesser degree. 1.2.2.0, 1.2.2.1, and 1.2.0.0 have the greatest increase in deaths relative to the prior year for those aged 5-20, and their peaks seem to happen around the same time. Among 20-35 and 35-65 year olds, the same causes of death as those in the younger age group peaks. Those aged 65+ *also* see a greater increase in these causes, and a slight increase with a peak corresponding to that of the wave peak in deaths to and 2.4.0.0. Several other causes of death during this time are present in 1918, the year of the flu that were not present in 1917. Perhaps these deaths were also attributable to the wave, although they cannot be compared to the prior period due to the absence of deaths. Other figures show the gross (Figure C.6) and percentage (Figures C.7) differences of selected causes of death for each age group during the wave.

Table C.2 Differences in deaths by selected cause, herald wave 1918

CC Code	Spring 1917	Spring 1918	Difference	Percent Difference
1.2.2.0	146	616	470	321.92
1.4.2.0	52	158	106	203.85
1.4.4.0	37	75	38	102.70
2.11.0.0	26	49	23	88.46
2.5.0.0	26	49	23	88.46
1.2.2.1	186	343	157	84.41
2.6.0.0	90	158	68	75.56
1.1.2.0	86	135	49	56.98
1.4.6.0	37	50	13	35.14

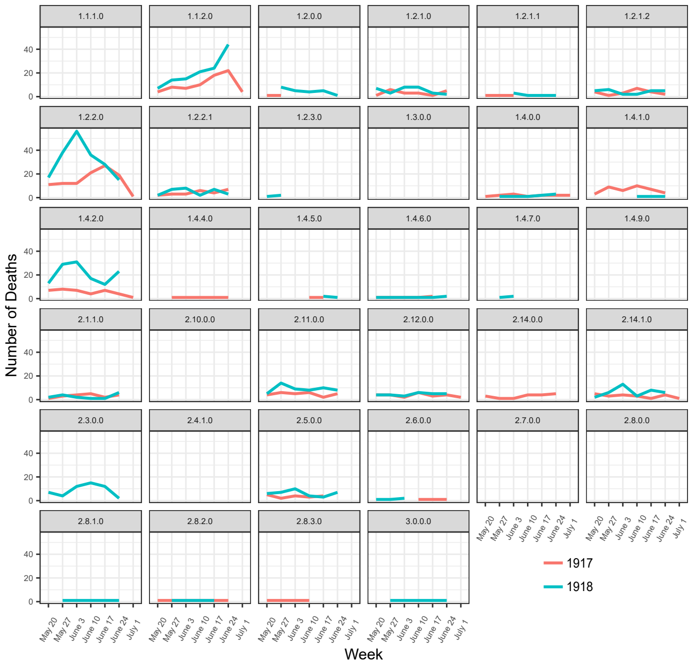


Fig. C.1 Time series of deaths by cause during herald wave, ages 0-5

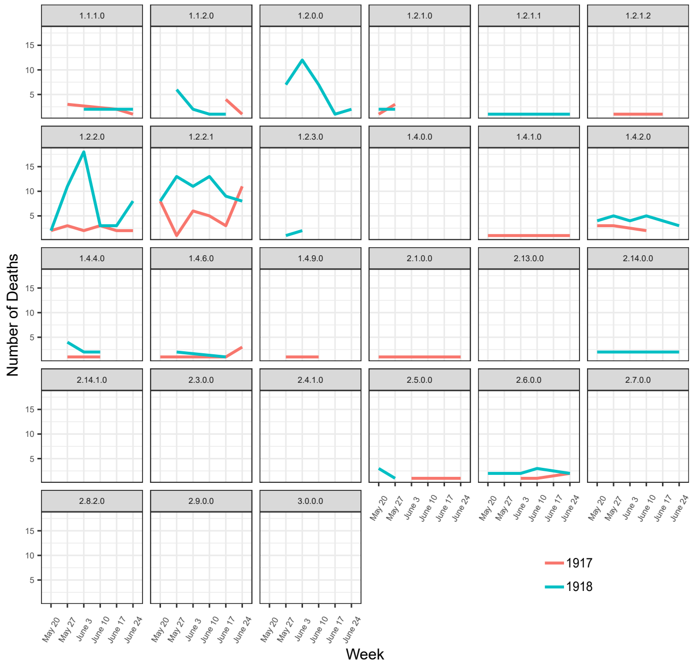


Fig. C.2 Time series of deaths by cause during herald wave, ages 5-20

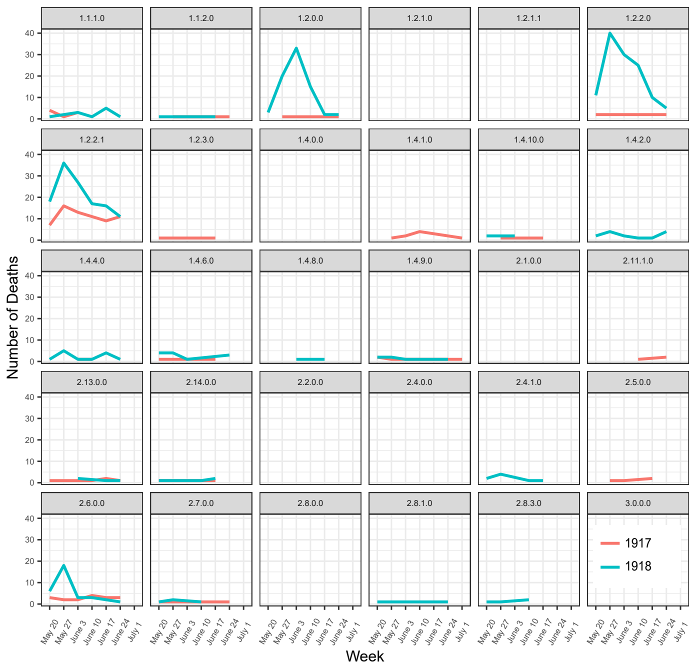


Fig. C.3 Time series of deaths by cause during herald wave, ages 20-35

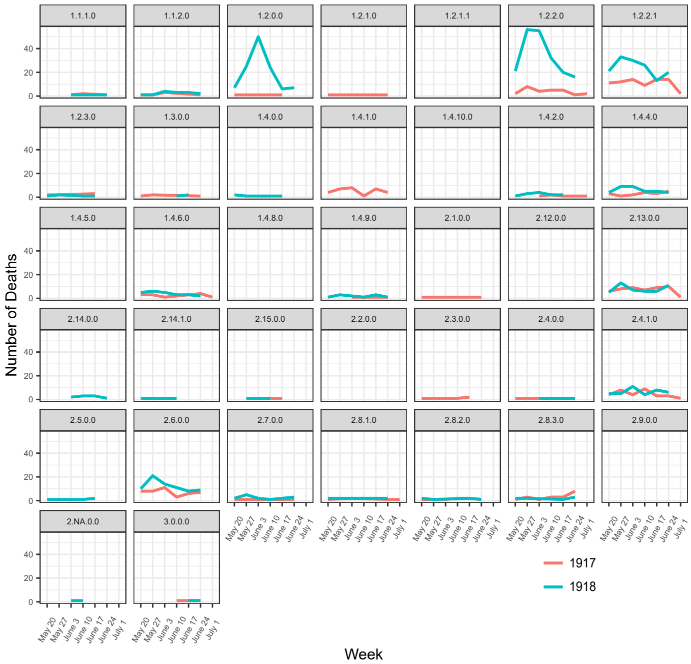


Fig. C.4 Time series of deaths by cause during herald wave, ages 35-65

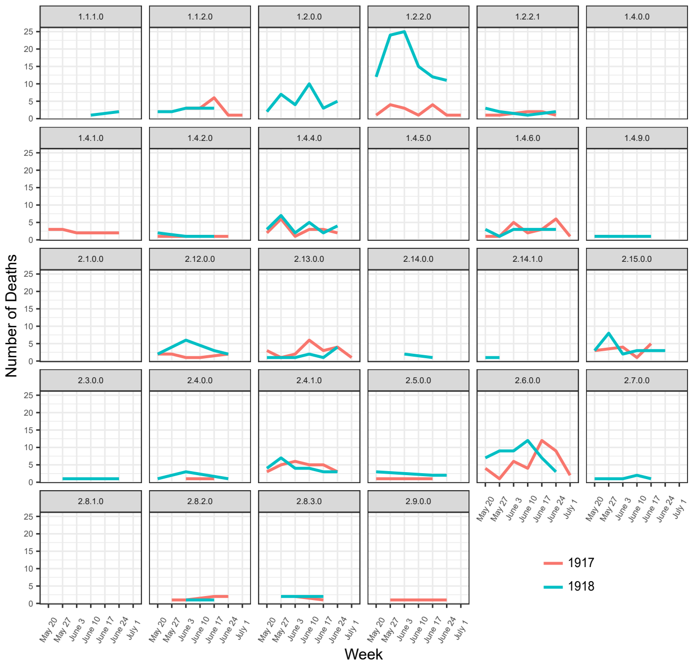


Fig. C.5 Time series of deaths by cause during herald wave, ages 65+

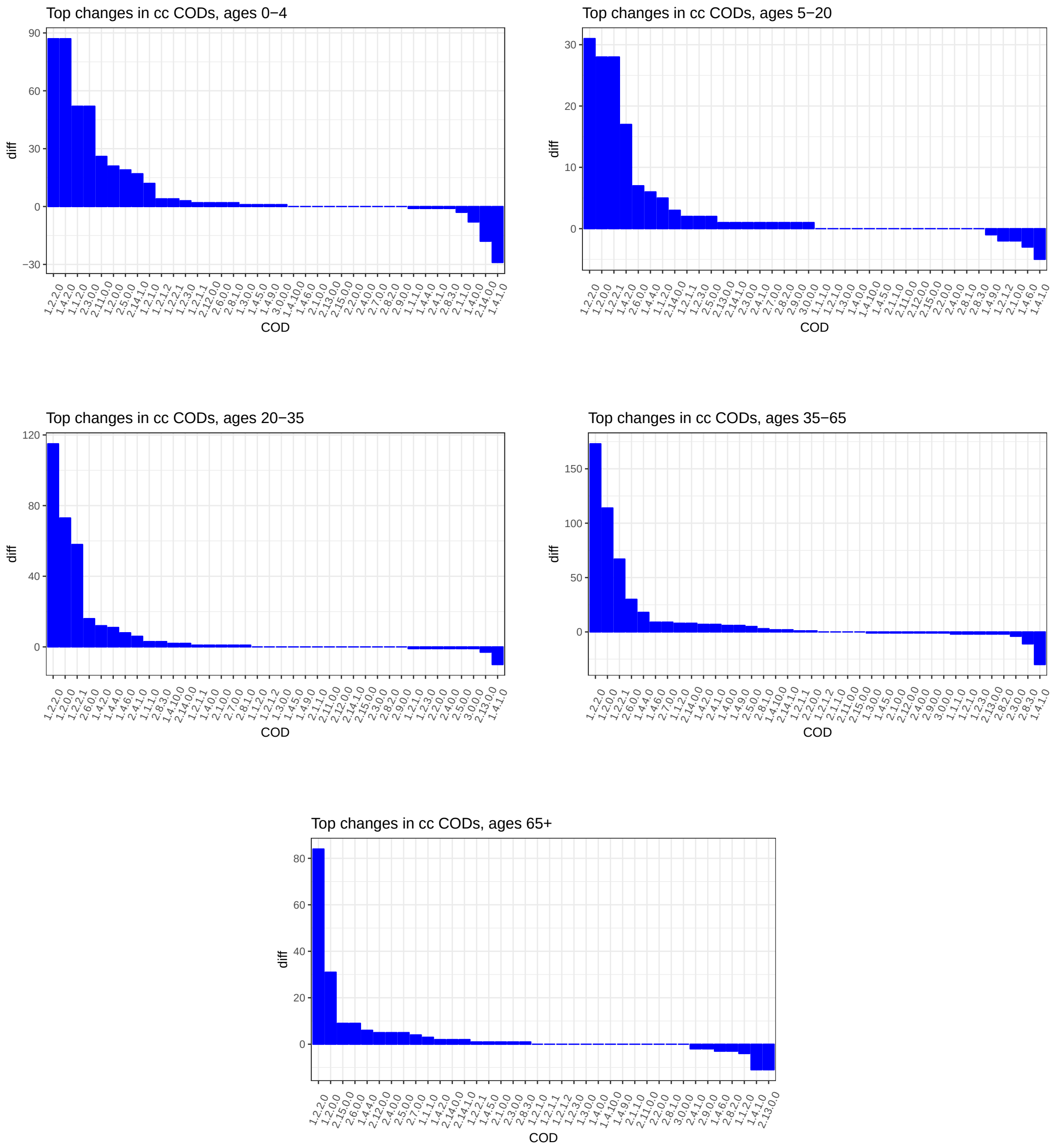


Fig. C.6 Gross differences in cause of death between 1917 and 1918 during herald wave by age group

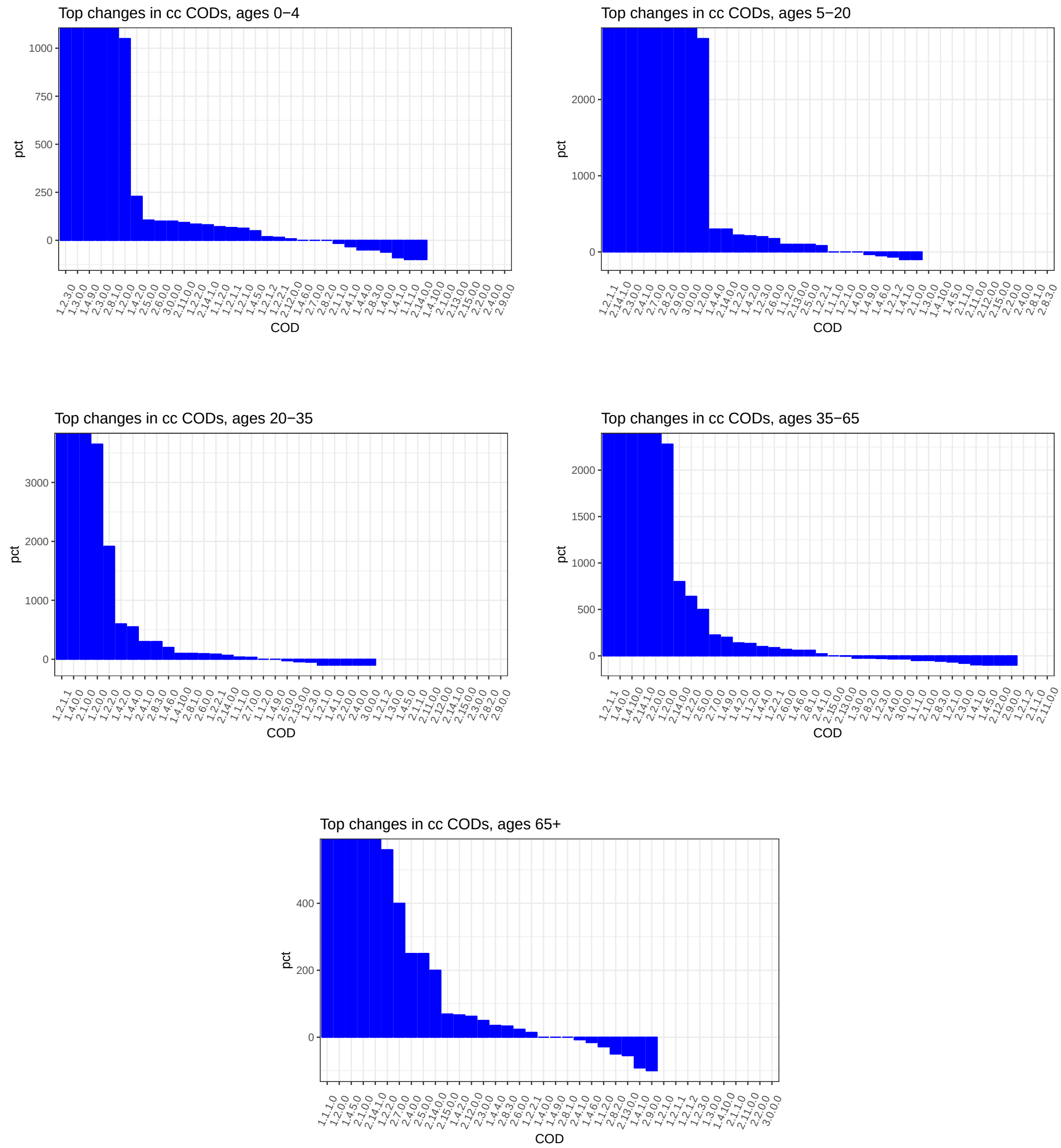


Fig. C.7 Percentage differences in cause of death between 1917 and 1918 during herald wave by age group

C.1.2 Fall/Winter Wave 1918-1919

Here, similar graphs to those in the Herald wave are displayed; figures C.8, C.9, C.10, C.11, C.12 show the number of deaths per week by selected cause according to age group. Subsequent figures (C.13 and C.14) show the absolute and percentage changes by age group for selected causes. In the herald, similar causes of death peak (relative to the year before) as in the Spring wave, but the amount of increase is much higher than that in the herald. More variation occurs in the infant and young children than in other ages, which see wave-corresponding peaks in 1.2.1.1, 1.4.2.0 , 1.2.2.1. These causes slightly differ among those 5-65, where 1.2.2.0 and 1.2.0.0 also peak according to the wave. Differences in mortality by cause of death among those older than 65 are not as visible as in the younger ages; they only see noticeably higher mortality during the herald wave to 1.2.2.0.

Table C.3 Differences in deaths by selected cause, fall/winter wave 1918-1919

CC Code	Spring 1917	Spring 1918	Difference	Percent Difference
1.2.1.1	72	462	390	541.67
1.2.0.0	198	1196	998	504.04
1.4.2.0	361	694	333	92.24
2.8.1.0	55	92	37	67.27
1.2.2.0	1885	3129	1244	65.99
2.3.0.0	59	95	36	61.02
2.4.0.0	66	92	26	39.39
1.2.3.0	42	55	13	30.95
2.15.0.0	220	280	60	27.27
1.2.2.1	1376	1737	361	26.24
2.14.1.0	153	186	33	21.57
1.1.1.0	109	130	21	19.27
2.4.1.0	541	608	67	12.38

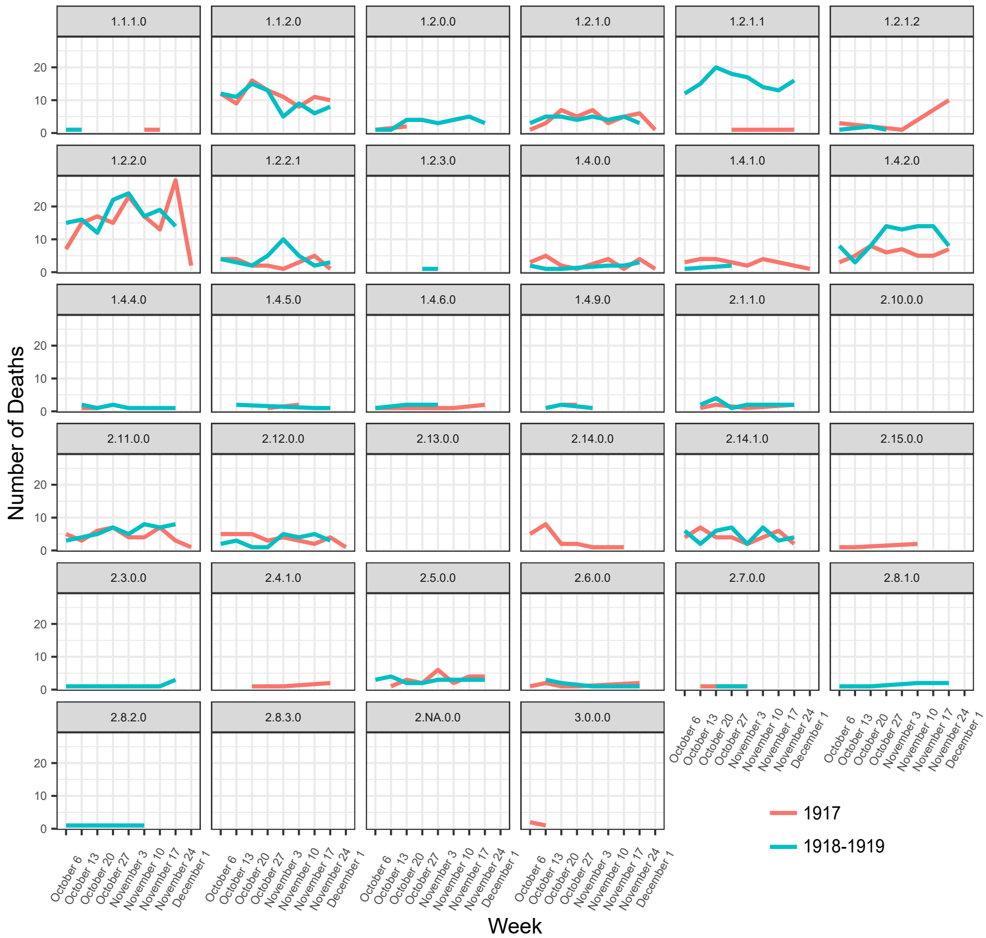


Fig. C.8 Time series of deaths by cause during fall/winter wave, ages 0-5

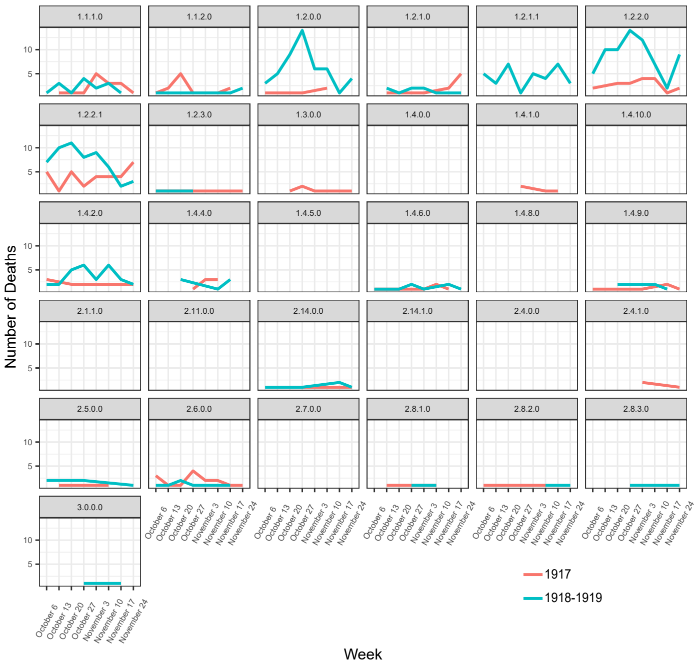


Fig. C.9 Time series of deaths by cause during fall/winter wave, ages 5-20

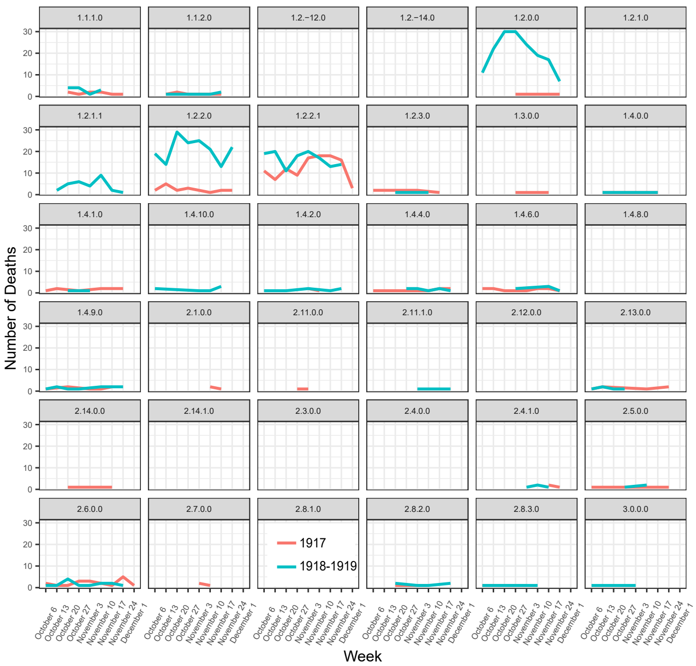


Fig. C.10 Time series of deaths by cause during fall/winter wave, ages 20-35

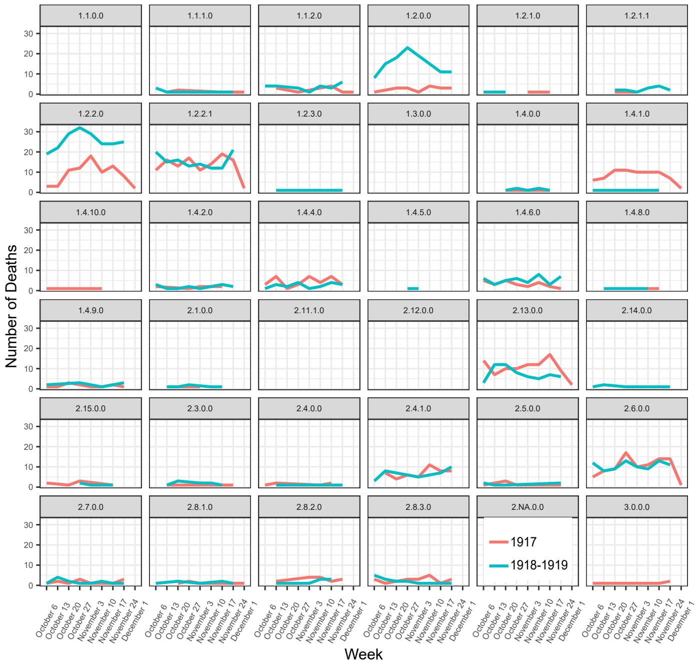


Fig. C.11 Time series of deaths by cause during fall/winter wave, ages 35-65

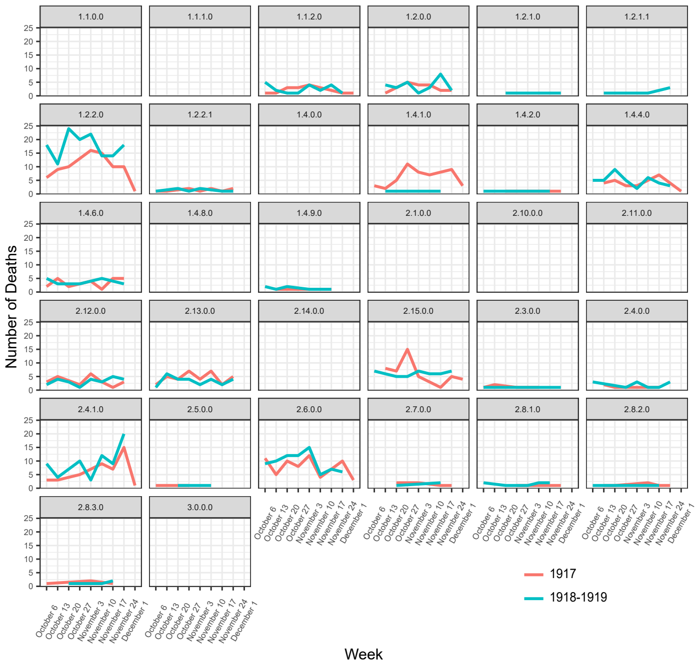


Fig. C.12 Time series of deaths by cause during fall/winter wave, ages 65+

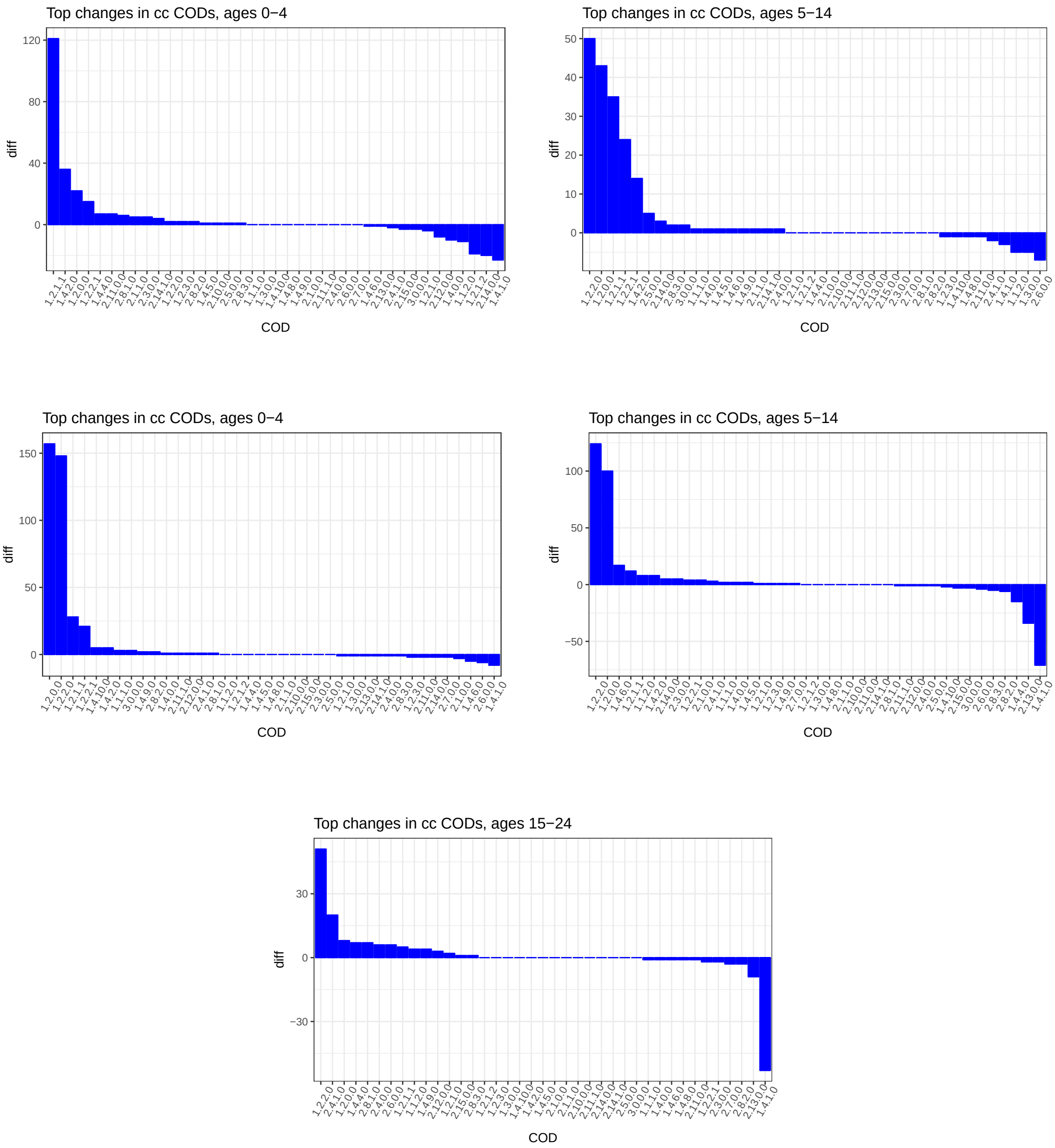


Fig. C.13 Gross differences in cause of death between 1917 and 1918-19 during fall/winter wave by age group

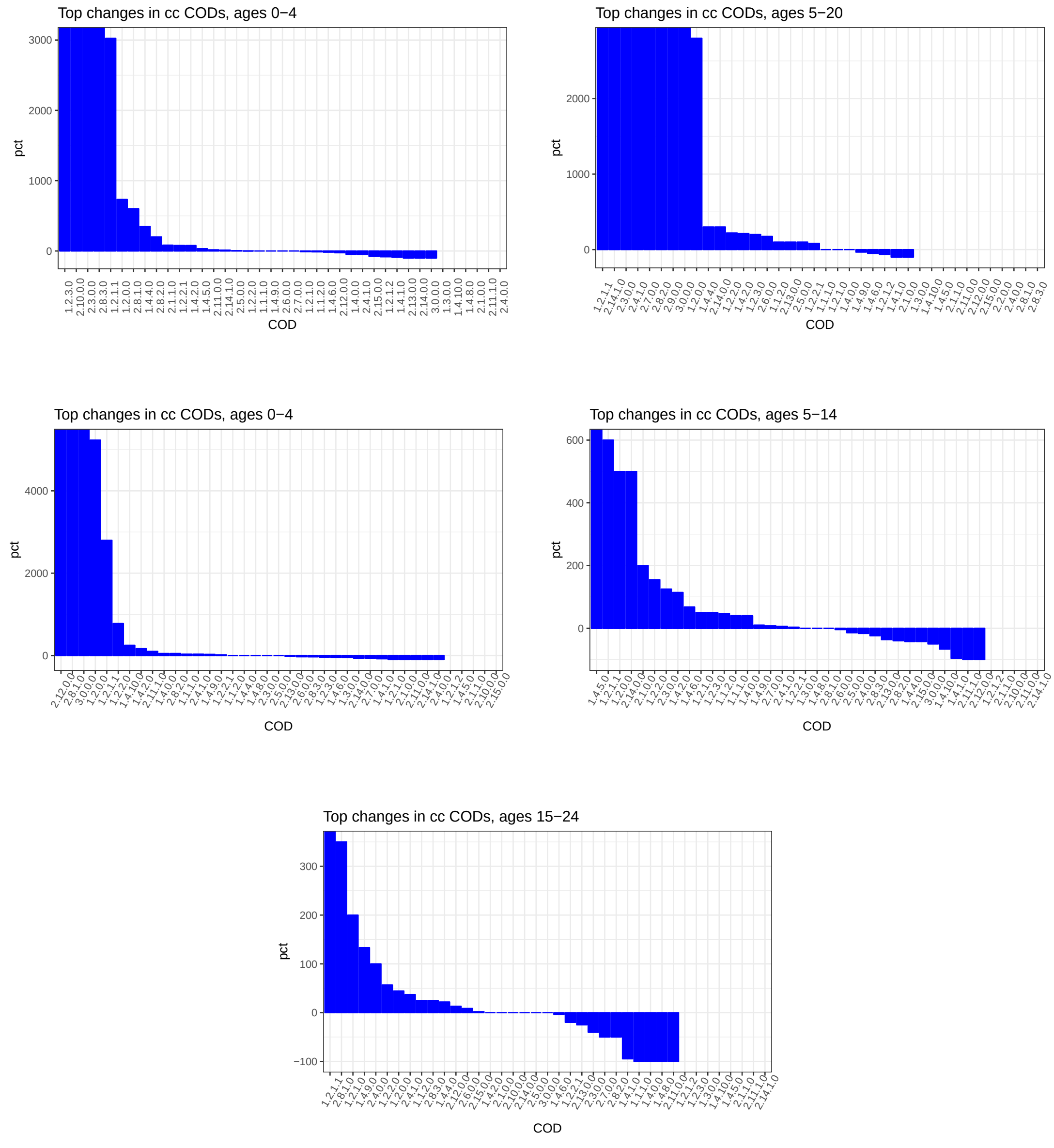


Fig. C.14 Percentage differences in cause of death between 1917 and 1918-19 during fall/winter wave by age group

C.1.3 Echo Wave

There is little discernment between the 1917-18 mortality and the corresponding time during the echo wave in 1918-19, as shown in figures C.15, C.16, C.17, C.18, and C.19. However, there are larger differences in young adult and older ages. The only noticeable difference between those ages 5-20 is to 1.2.0.0, but between ages 20-65, a higher number of deaths are attributed to 1.2.0.0, 1.2.2.0, and 1.2.2.1 (to a lesser extent among 25-35 year olds). Among those 65+, there appear to be greater deaths to 1.2.2.0 that correlate to the timing of the echo wave. Absolute and relative changes according to age group for causes are found in figures C.20 and C.21.

Table C.4 Differences in deaths by selected cause, echo wave 1919-1920

CC Code	Spring 1917	Spring 1918	Difference	Percent Difference
1.2.0.0	114	559	445	390.35
1.1.1.0	46	147	101	219.57
1.2.2.0	1096	2705	1609	146.81
1.4.2.0	154	380	226	146.75
2.8.1.0	26	50	24	92.31
2.4.0.0	34	60	26	76.47
1.2.1.0	85	144	59	69.41
2.7.0.0	69	103	34	49.28
2.15.0.0	101	149	48	47.52
2.11.0.0	118	173	55	46.61
2.14.1.0	62	89	27	43.55
1.2.1.2	78	107	29	37.18
1.2.2.1	616	815	199	32.31
2.5.0.0	104	135	31	29.81
2.6.0.0	522	633	111	21.26
2.4.1.0	276	332	56	20.29
1.1.2.0	211	253	42	19.91

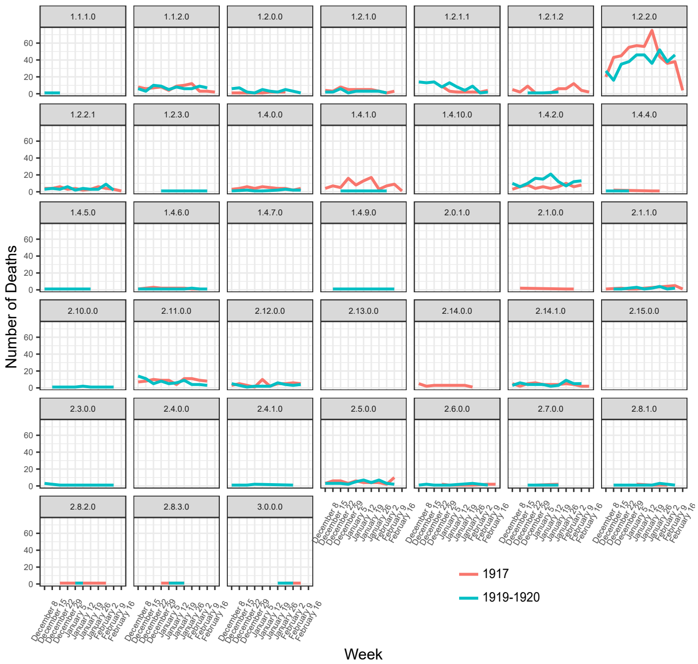


Fig. C.15 Time series of deaths by cause during echo wave, ages 0-5

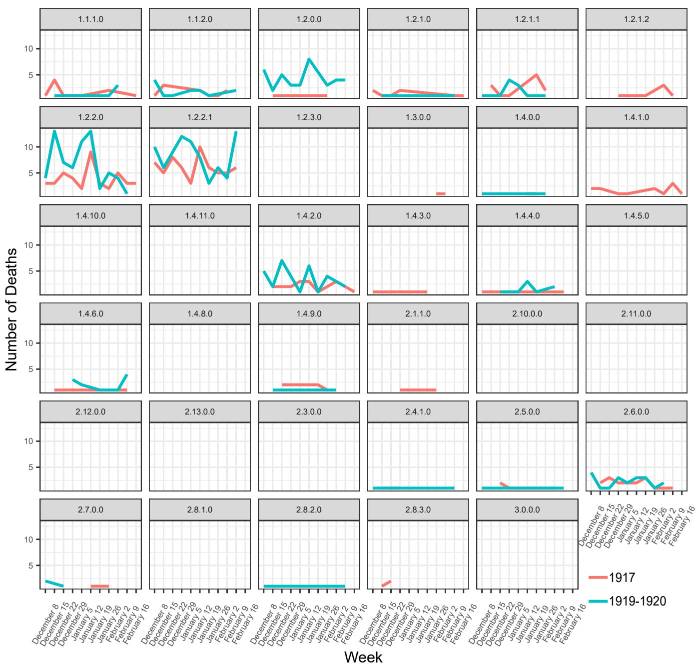


Fig. C.16 Time series of deaths by cause during echo wave, ages 5-20

Fig. C.17 Time series of deaths by cause during echo wave, ages 25-35

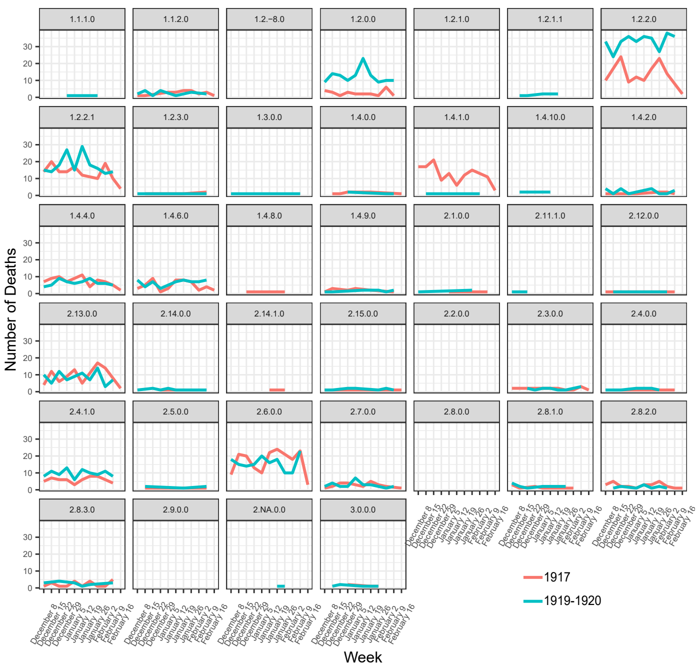


Fig. C.18 Time series of deaths by cause during echo wave, ages 35-65

Age Group	Total Excess Deaths	Weekly Excess Mortality Rate (Per 10,000)	Standardized Mortality Risk
Spring Wave, 1918			
[25,30)	104	14.49	2.33
Fall and Winter, 1918-19 -1919			
[25,30)	360	50.21	2.04
Winter Wave 1919-20-1920			
[25,30)	138	19.17	2.44

Fig. C.19 Time series of deaths by cause during echo wave, ages 65+

C.2 Age-specific excess, 25-30 year olds

Before settling on the final age groups, several smaller age groups were tested, especially focused around the ages of 25-30, as suggested by other literature (e.g. [110, 284]). However, these smaller age groups revealed no greater amounts of excess mortality than the older ages at this group. For example, the 25-30 age group had (all-cause) relative and absolute excess rates according to the table below.

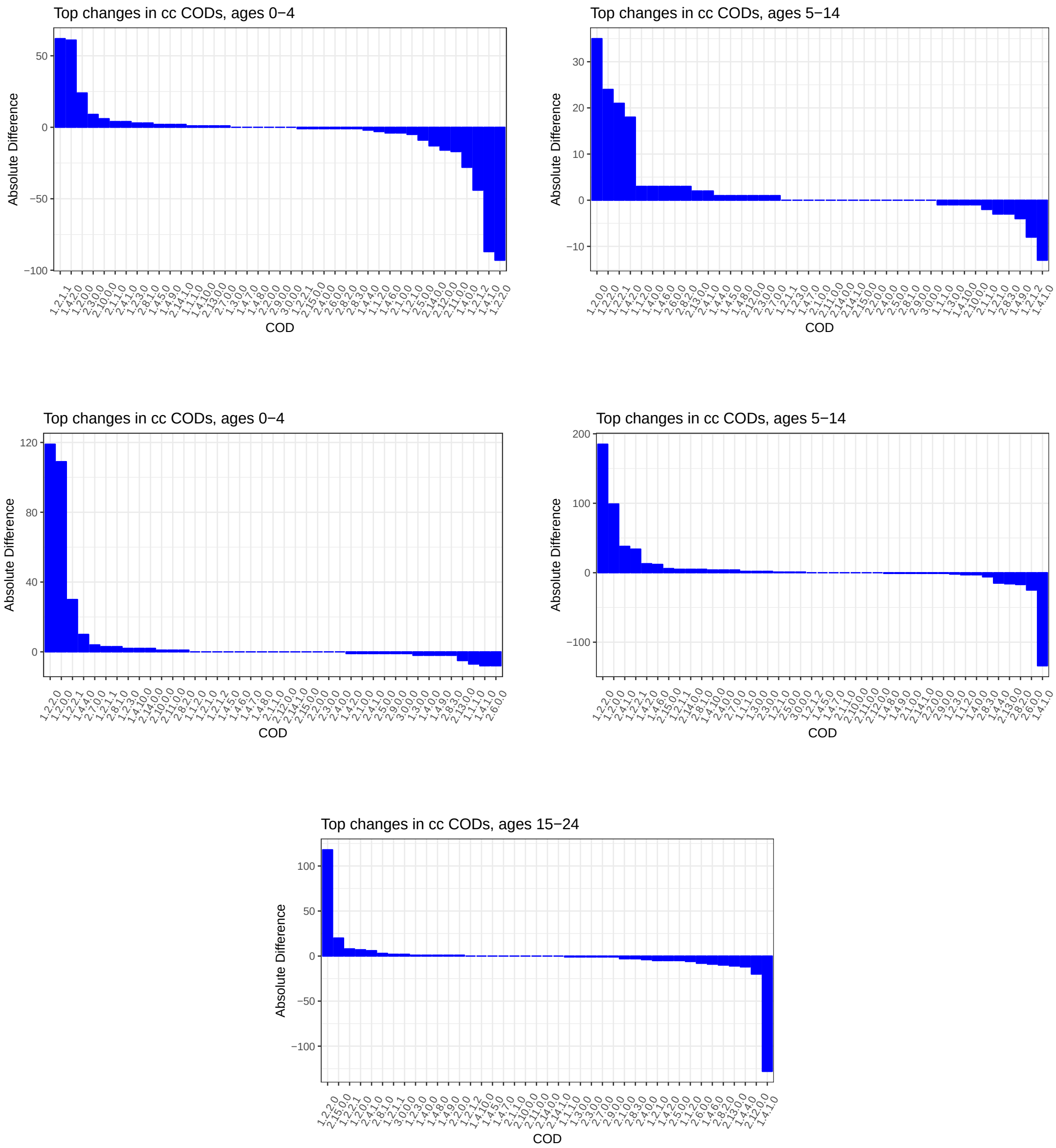


Fig. C.20 Gross differences in cause of death between 1917 and 1919-20 during echo wave by age group

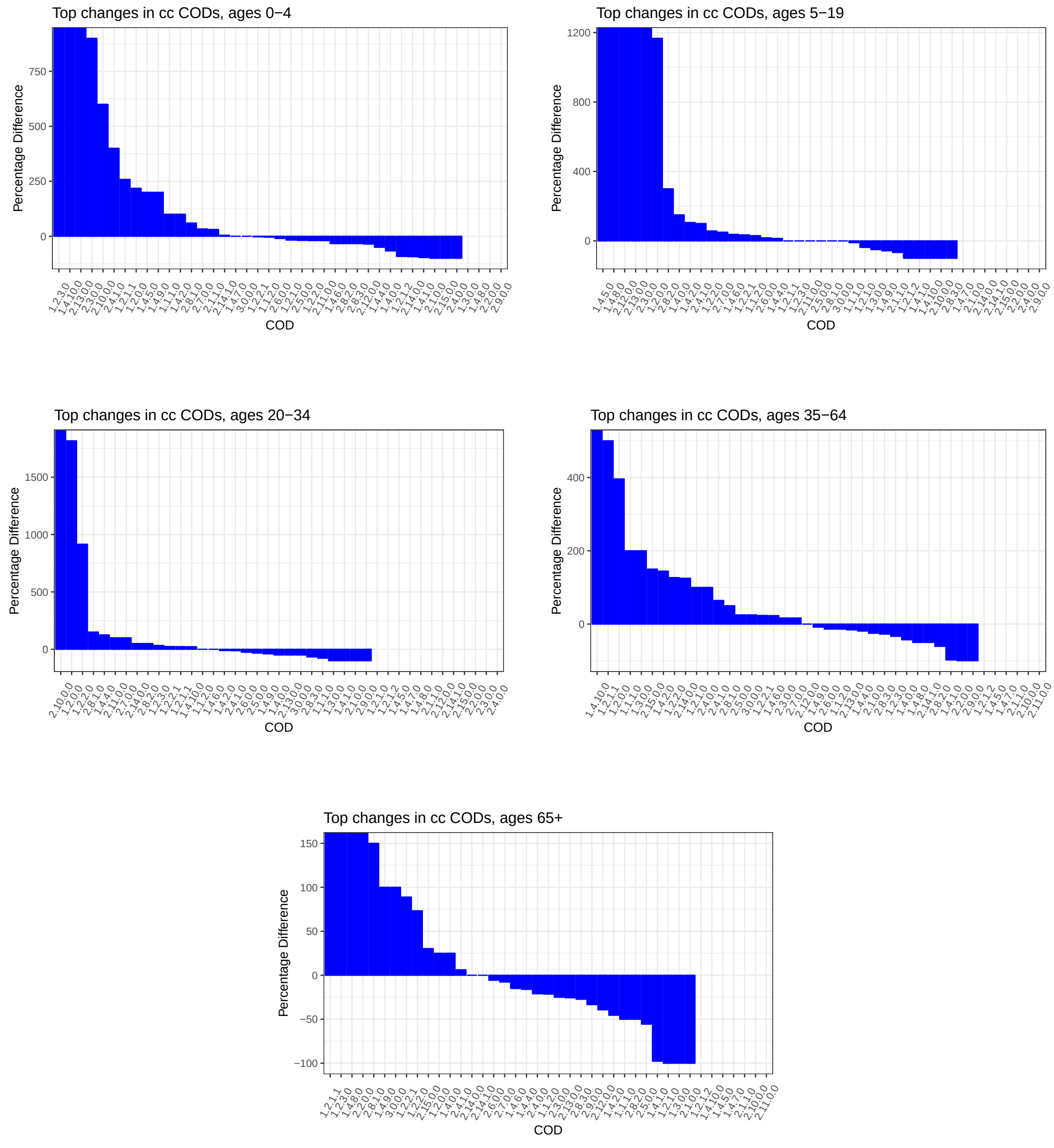


Fig. C.21 Percentage differences in cause of death between 1917 and 1919-20 during echo wave by age group

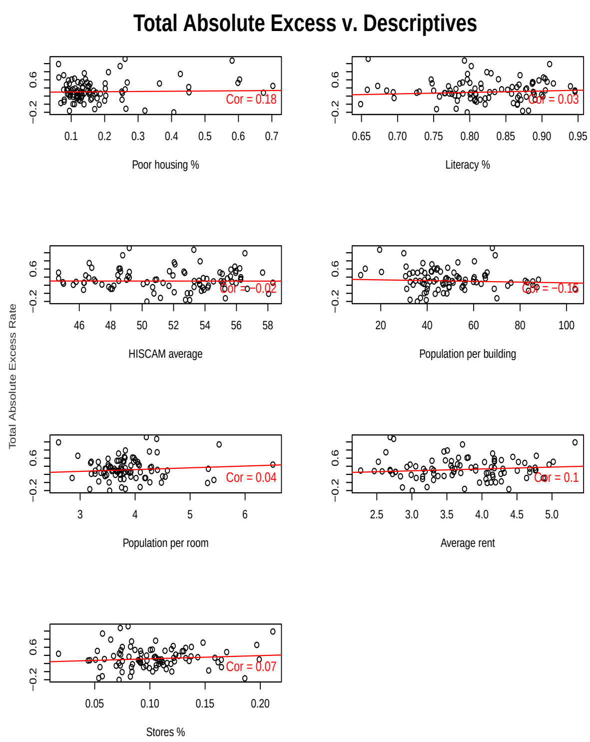
While the standardized mortality risk for 25 to 30 year olds *is* higher than their included age group, it seemed the overall differences was small enough to proceed with the current (larger) age groups. This makes directly comparable to the published Madrid-specific estimates of excess mortality during the Russian flu pandemic in 1889-90 [218].

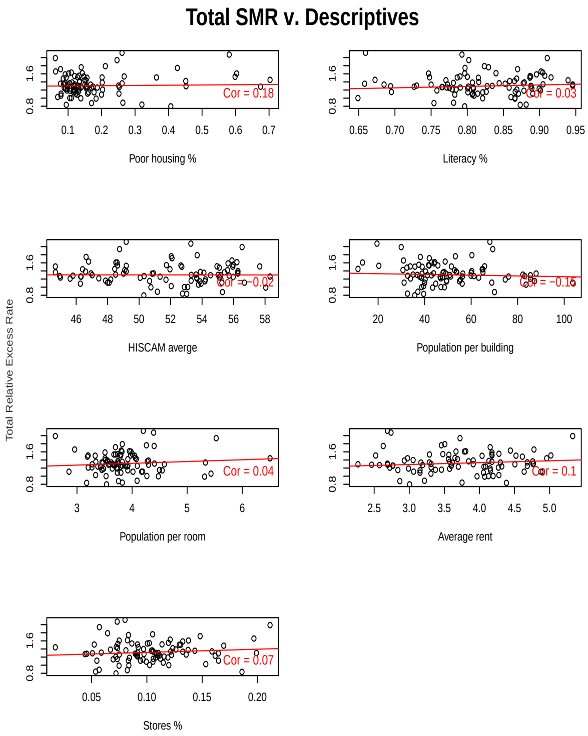
Appendix D

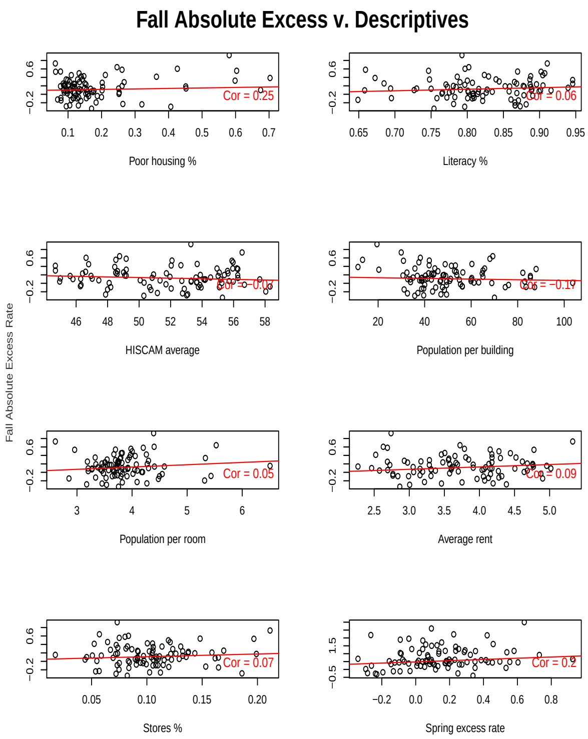
Additional Material: Chapter 5

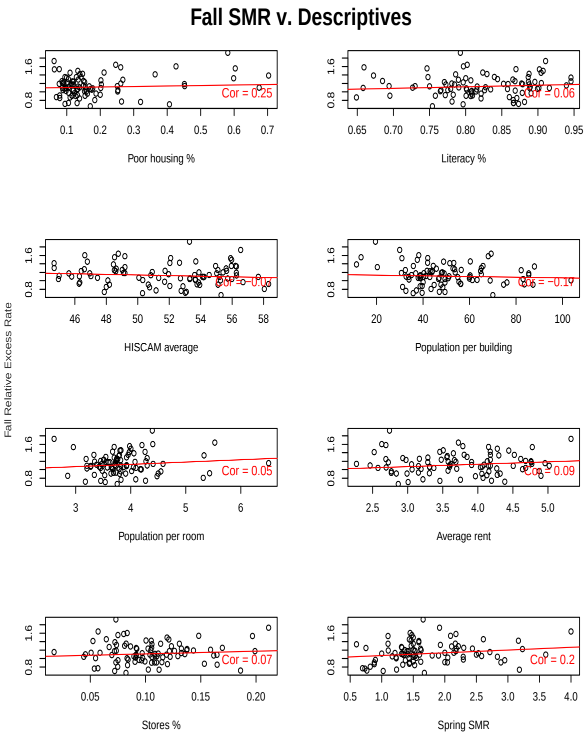
D.1 Correlation plots between explanatory and dependent variables

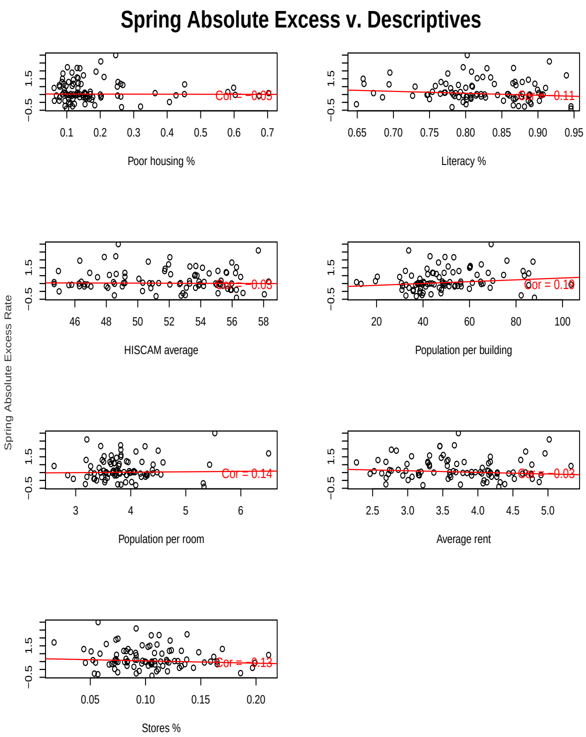
The following graphics show some correlation plots between the dependent variables of the neighborhood level analysis and the total absolute excess calculated for each neighborhood.

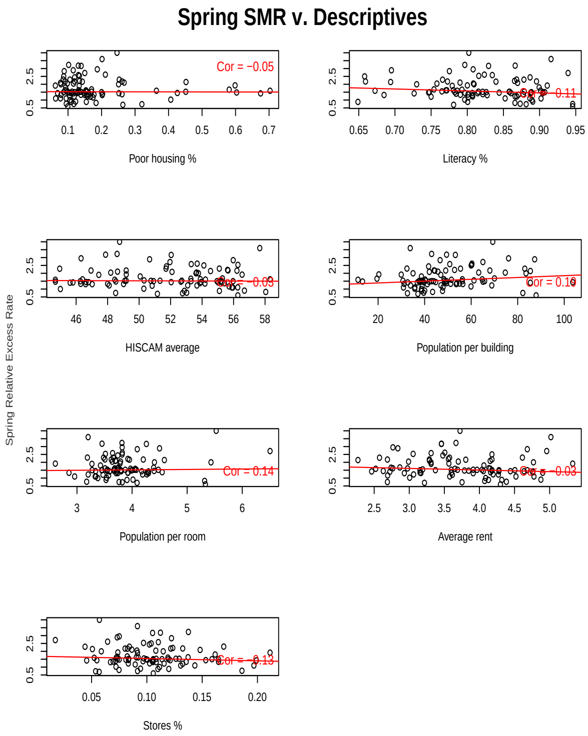


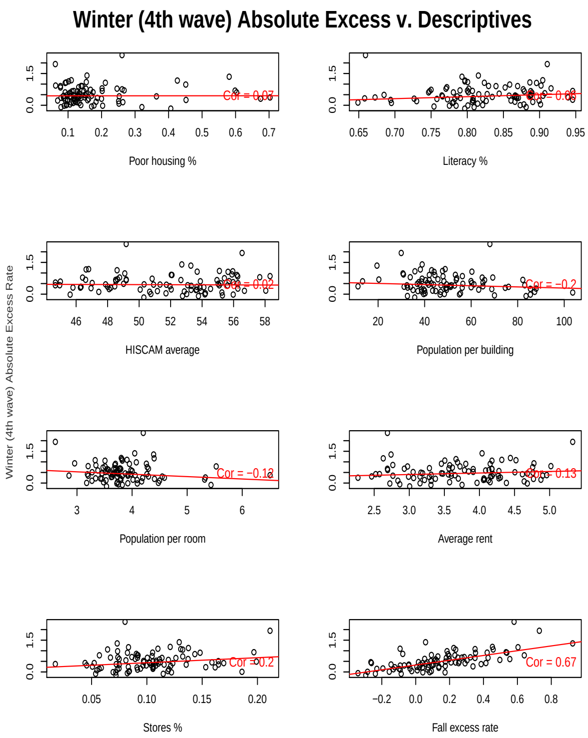

Total SMR v. Descriptives
Total Relative Excess Rate
Cor = 0.18
Poor housing %
Cor = 0.03
Literacy %
Cor = −0.02
HISCAM averge
Cor = −0.16
Population per building
Cor = 0.04
Population per room
Cor = 0.1
Average rent
Cor = 0.07
Stores %

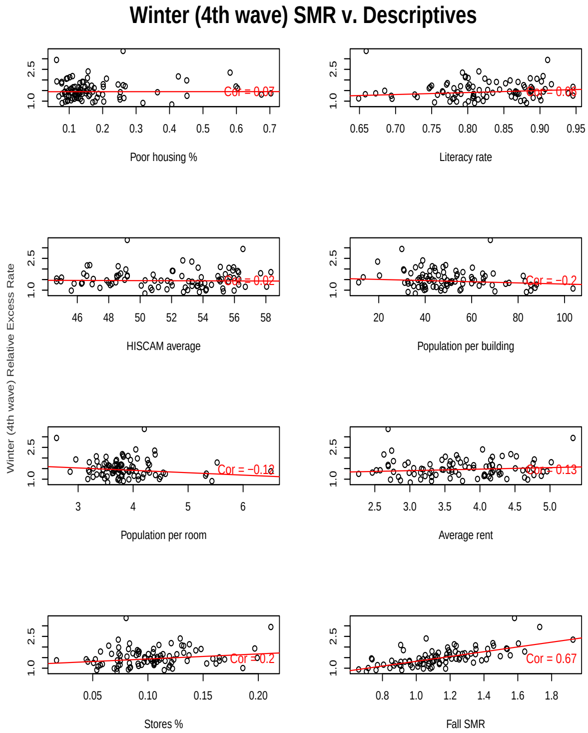

Fall Absolute Excess v. Descriptives
Fall Absolute Excess Rate
Cor = 0.25
Poor housing %
Cor = 0.06
Literacy %
Cor = −0.08
HISCAM average
Cor = −0.17
Population per building
Cor = 0.05
Population per room
Cor = 0.09
Average rent
Cor = 0.07
Stores %
Cor = 0.2
Spring excess rate


Fall SMR v. Descriptives
Fall Relative Excess Rate
Poor housing %
Literacy %
HISCAM average
Population per building
Population per room
Average rent
Stores %
Spring SMR
Cor = 0.25
Cor = 0.05
Cor = 0.09
Cor = 0.07
Cor = 0.2


Spring Absolute Excess v. Descriptives
Spring Absolute Excess Rate
Poor housing %
Literacy %
HISCAM average
Population per building
Population per room
Average rent
Stores %
Cor = 0.14


Spring SMR v. Descriptives
Spring Relative Excess Rate
Cor = −0.05
Poor housing %
Literacy %
HISCAM average
Cor = 0.16
Population per building
Cor = 0.14
Population per room
Average rent
Stores %


Winter (4th wave) Absolute Excess v. Descriptives
Winter (4th wave) Absolute Excess Rate
Poor housing %
Literacy %
HISCAM average
Cor = −0.2
Population per building
Population per room
Average rent
Cor = 0.2
Stores %
Cor = 0.67
Fall excess rate



D.2 District Level Analyses

While chapter 5 focuses on a select number of deaths occurring outside of hospitals in a subset of neighborhoods, the district-level analysis here encompasses all deaths occurring in the city. Table D.1 shows the population (in 1918) and total number of deaths registered in each district in Madrid between 1917 and 1922. Next to it, a map of the city shows the layout of each district in the city.

District	Population	Deaths	Rate
Buenavista	86502	8573	0.0168
Centro	47448	5281	0.0186
Chamberi	86513	11063	0.0217
Congreso	72656	10521	0.0245
Hospicio	54466	5667	0.0175
Hospital	83261	19123	0.0391
Inclusa	68707	12420	0.0306
Latina	81057	10252	0.0214
Palacio	65605	7269	0.0187
Universidad	82722	12857	0.0264

Fig. D.1 Madrid by District, 1916-1922

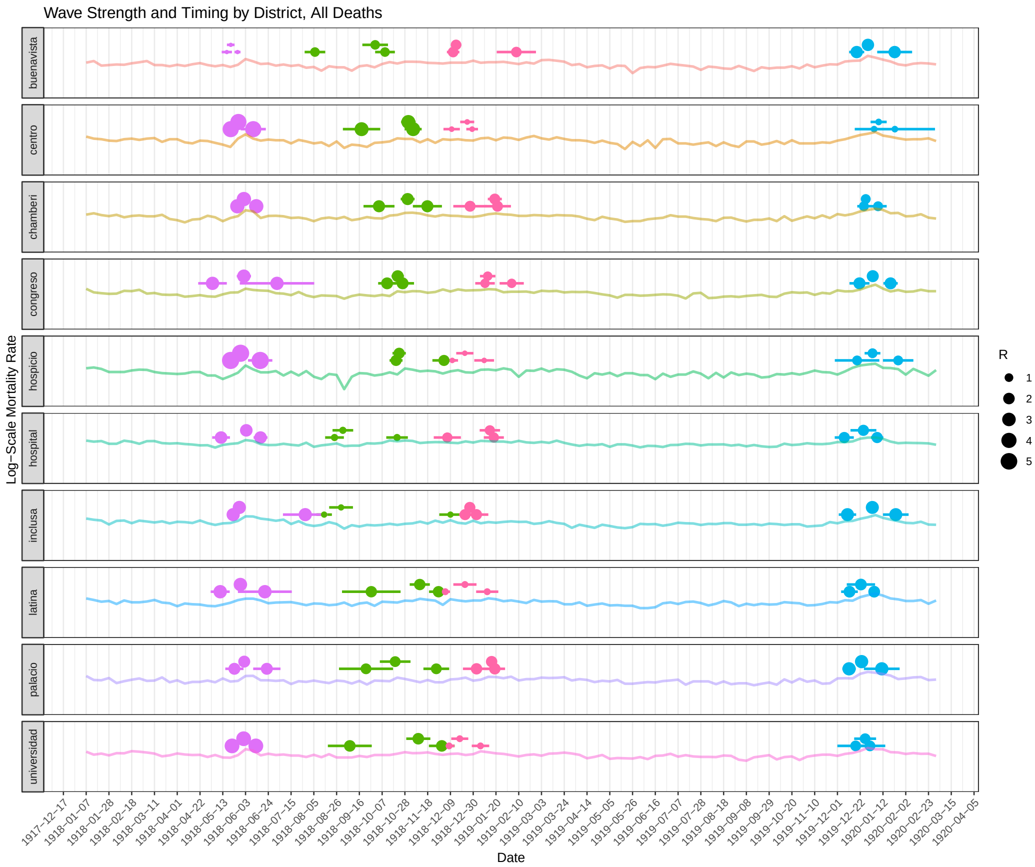


Fig. D.2 Segmented Regression for each district: circles show start, peak, and ending dates for each wave relative to R, lines represent log-mortality rate.

D.2.1 Differences in Timing

During the time of the outbreaks, the layout and transportation system in the city facilitated the easy movement of people throughout the city–people were not, in theory, bound to a specific area area. Additional aspects known to affect flu transmission, such as large climactic differences, were also not present in the city. Furthermore, the sheer area of each district meant that to some extent, a large amount of socioeconomic heterogeneity within each district existed. Taking this all into consideration, it would be reasonable to expect the flu to start, peak, and end in district at the same time, and that the relative strength of each wave was similar. To test this hypothesis, I use breakpoint regression similar to that in chapter 2.

The results of the breakpoint analysis of each district can be found in figure D.2. Note that all four waves could not be estimated in each district, likely due to the wave not maintaining a traditional shape *or* that in a particular district, smaller numbers of deaths existed leading to larger variations in day-to-day mortality for which the breakpoint analysis is not an acceptable method to use.

In the spring (Table D.1), fall (Table D.2), and winter of 1918 (Table D.3), the city of Madrid experienced three epidemic waves of influenza, each with lower intensity than the preceding on. The spring herald wave occurs throughout the month of May and early June, beginning in the districts of Inclusa, Latina, and Hospital, then moving towards other parts of the city. The Reproduction number is highest in the district of Hospicio. As seen in other fall 1918 waves throughout the world, the city-wide ascending phase lasts much longer than the spring, though overall, R_0 is lower and does not reach epidemic levels in all districts [1]. Considering all districts in Madrid, the winter wave is much shorter and lower in intensity (R_0) than both the Spring and Summer. The weakness of this wave is further evident at the district level, where most districts do *not* reach epidemic levels. The next year, Madrid experienced another large fourth wave of influenza (Table D.4). The strength of the wave is high across nearly all districts (see previous footnote).

Within each wave, we see considerable district-level variation between the start of the ascension phase and peak of the epidemic. In fact, the calculated date of some districts´ peak influenza occurrence arrives before others are estimated to have entered the epidemic period. Within a single wave, some districts experience particularly long periods of epidemic-level activity, while others are much shorter, such as in the case of Buenavista and Centro in the Fall of 1918. There is also some evidence to support the theory of acquired immunity that may have tempered the effect between waves. When considering the first three waves, Buenavista expirenced the strongest wave last, after two relatively mild outbreaks in the spring and fall of 1918. However, nearly half the districts face the strongest wave first, followed by more mild (in terms of Reproduction numbers) in the fall and winter; perhaps this can be attributed to greater immunity in subsequent waves due to smaller genetic drift in the virus and prior exposure in the district during the first wave.

Nonetheless, other factors unique to each district should be considered when looking at differing strengths. For example, the presence of the provincial hospital in the Hospital district means that the district had consistently high background mortality. Thus, the estimation method of R, which relies on the change between background and epidemic-level mortality, may not be underestimated if (a) there was a prolonged rise to peak mortality levels (given an un-ceasing movement of more ill Madrielleños to the hospital) or (b) the change in new deaths during the epidemic was smaller than other districts *relative* to the background. Furthermore, within several districts, large confidence intervals exist in the estimation of the start, peak, and end dates of each wave. This makes its difficult to ascertain with 100% certainty that

[1] The Reproduction number in Hospital does not reach the epidemic threshold. However, this district contains higher overall mortality, meaning a larger number of deaths (when, as in this case, total deaths rather than only Influenza related deaths are being considered) are needed to significantly increase mortality to an epidemic level

these waves did, in fact begin, peak, and end at different times. This is likely an artifact of the persistence of the virus in the early fall of 1918 through the spring of 1919. As noted, because this outbreak was protracted, some districts did not experience a singular peak from which to accurately estimate the breakpoints in segmented regression.

Table D.1 Herald Wave Timing by District, 1918

District	**Start Date**	**Peak Date**	**End Date**	**Length** ***(days)***	R_0
Inclusa	04 May	23 May	28 May	24	1.20
Latina	09 May	29 May	21 June	42	3.03
Hospital	11 May	03 June	16 June	36	2.49
Hospicio	20 May	29 May	15 June	25	4.83
Centro	21 May	27 May	09 June	19	3.46
Buenavista	22 May	27 May	25 June	33	2.79
Congreso	23 May	27 May	02 Jul	40	2.08
Palacio	23 May	02 June	23 June	30	2.22
Universidad	23 May	01 June	12 June	20	3.71
Chamberi	25 May	01 June	12 June	18	3.70
Madrid	21 May	31 May	15 June	25	2.97

Table D.2 Fall Wave Timing by District, 1918

District	**Start Date**	**Peak Date**	**End Date**	**Length** ***(days)***	R_0
Inclusa	13 Aug	31 Aug	08 Dec	118	0.62
Buenavista	07 Sept	27 Oct	11 Dec	96	2.10
Universidad	07 Sept	09 Nov	01 Dec	85	2.04
Hospital	13 Sept	23 Oct	08 Dec	56	1.97
Centro	29 Sept	22 Oct	06 Nov	39	2.37
Chamberi	04 Oct	30 Oct	17 Nov	45	2.27
Congreso	12 Oct	17 Oct			1.88
Hospicio	19 Oct	23 Oct	03 Dec	44	1.81
Palacio	21 Sept	18 Oct	26 Nov	65	1.68
Latina	31 Oct	04 Nov	27 Nov	27	1.73
Madrid	24 Sept	26 Oct	19 Nov	56	1.81

D.2.2 Excess Mortality

To find excess mortality for each district, the same process was followed as in 4. After calculating a baseline from the mortality time series in 1917, excess deaths during wave periods are quantified as the amount over the baseline on weeks in which district mortality eceeds the 95% threshold. Tables D.5 show these results.

Table D.3 Winter Wave Timing by District, 1918-19

District	**Start Date**	**Peak Date**	**End Date**	**Length *(days)***	R_0
Chamberi	04 Dec	27 Dec			0.88
Hospicio	07 Dec	01 Feb	08 Jan	29	0.47
Universidad	07 Dec	17 Dec	13 Jan	29	0.62
Inclusa	07 Dec	11 Dec	31 jan	55	0.61
Centro	11 Dec	17 Dec	31 Dec	20	0.48
Latina	16 Dec	21 Dec	31 Jan	38	0.66
Buenavista	22 Dec	28 Jan	09 Feb	60	1.61
Palacio	24 Dec	29 Dec	11 Jan	20	0.62
Hospital	29 Dec	06 Jan	04 Feb	60	1.46
Congreso	15 Jan	05 Feb	09 Feb	26	0.56
Madrid	25 Dec	11 Jan	26 Feb	44	1.33

Table D.4 Echo Wave Timing by District, 1919-20

District	**Start Date**	**Peak Date**	**End Date**	**Length *(days)***	R_0
Centro	04 Dec	02 Jan			0.40
Palacio	06 Dec	29 Dec	06 Jan	31	3.39
Hospital	07 Dec	18 Dec	06 Jan	29	1.65
Inclusa	10 Dec	03 Jan	08 Jan	29	2.87
Buenavista	12 Dec	17 Dec	28 Dec	16	0.78
Latina	12 Dec	22 Dec	03 Jan	23	2.09
Universidad	17 Dec	28 Dec	28 Jan	42	1.83
Congreso	25 Dec	31 Dec	19 Jan	25	2.08
Chamberi	02 Jan	23 Jan	27 Jan	25	0.89
Hospicio	02 Jan	12 Jan	18 Jan	16	0.56
Madrid	25 Dec	11 Jan	18 Jan	39	2.38

D.2.3 Principal Component Regression

While the data identifies and confirms district-level variation in the timing and intensity of influenza waves in Madrid, the districts each have a unique demographic and socio-economic structure (age, income, etc.). Thus, we look at the relationship between the structure and population of each district and the total relative excess mortality during epidemic waves in 1918-1920.

The factor loadings for the district-level principal components are found in figure D.3. The results of the Principal Components Analysis revealed three main components. The first was primarily loaded with variables that described types of housing and buildings primarily occupied by those with lower social status (basement and first floor apartments occupied by building doormen and cleaners), as well as measures of population density (per building), and unrented apartments. The second component is loaded mostly according to types of

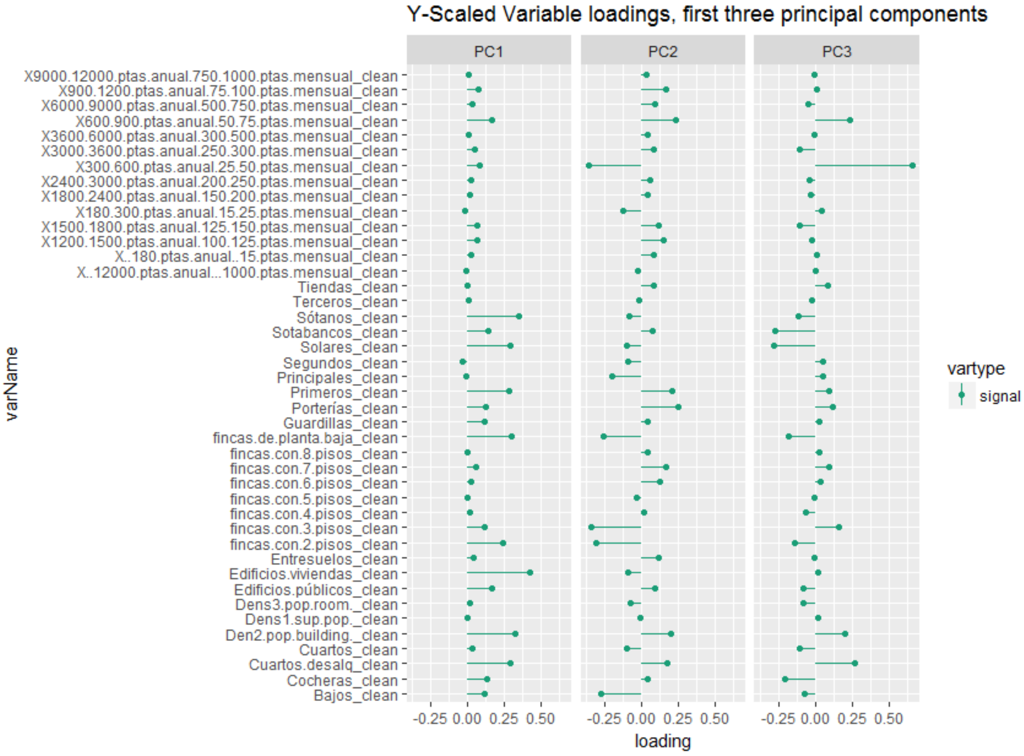


Fig. D.3 Principal Component Factor Loadings

buildings that may be associated with population with comfortable income (buildings in residential areas with nice apartments and strong negative loadings from those districts with many lower-rental priced and lower level apartments). The third component is primarily loaded by variables describing low rental prices in the district.

Our simple regression models used these extracted components and their loadings, along with selected additional variables, to explore the relationships between the relative excess mortality and the district make up. Results are show in table D.5.

The first model includes only the principal components, which describe the constructed environment in the city. This model finds that there is a strong correlation between the elements of the first and third components and higher overall relative excess mortality during the pandemic epidemic flu waves. These components were largely positively loaded on variables indicating types of residential buildings and rental prices associated with lower income individuals. The second analysis also includes a variable to account for a portion of the age structure of each barrio. We use the proportion of individuals between 5 and 65 years of age, as these ages correspond to those with higher excess standardized mortality in previous age-specific calculations in the city [72]. However, the addition of this variable does not have an affect on the overall model, which varies negligibly from the first. Finally,

Table D.5 Principle Component Regression Results

	Dependent variable:		
	Standardized Mortality Ratio (All Deaths during Pandemic Wave Periods)		
	(1)	(2)	(3)
PC1	0.423***	0.424***	0.415**
	(0.084)	(0.092)	(0.106)
PC2	−0.138	−0.177	−0.075
	(0.129)	(0.261)	(0.449)
PC3	0.670**	0.665**	0.824
	(0.226)	(0.248)	(0.600)
Literacy			−0.342
			(1.147)
Population 5-65 years old		0.388	0.819
		(2.186)	(2.818)
Constant	1.177***	0.842	0.749
	(0.010)	(1.888)	(2.111)
Observations	10	10	10
R^2	0.855	0.856	0.859
Adjusted R^2	0.782	0.740	0.683
Residual Std. Error	0.032 (df = 6)	0.035 (df = 5)	0.039 (df = 4)
F Statistic	11.780*** (df = 3; 6)	7.417** (df = 4; 5)	4.870* (df = 5; 4)
Note:			*p<0.1; **p<0.05; ***p<0.01

we look at the literacy level (percentage that could read and write) in each district. While this variable does not itself have a significant relationship with the overall excess mortality, it tempers the effect of the third principal component. Nonetheless, first factor still plays a large role in the epidemic excess mortality.

All together, we find that the regression model only using the constructed principal components best explains the variation in excess district mortality, meaning that external and built environment likely had a strong impact on the way the flu spread and affected morality risk. We note that the general construction of the district may also have influenced social and behavioral dynamics in the population, which also may have increased or decreased mortality risk during the epidemic.

In all these results largely support recent analyses finding higher epidemic mortality in areas with poorer quality built environment, although they do not find that literacy level, as in the case of Chicago, shared a relationship with mortality risk during the epidemic [123]. Nonetheless, Madrid had a population of nearly three-quarters of a million people during this time, and the districts themselves were very heterogeneous. Thus, we seek to expand our analysis to see in what ways a smaller environment, at the neighborhood level, could have impacted the mortality more or less than at the district level.

D.3 Weekly mortality rates for 91 Madrid neighborhoods between January 1917 and December 1922

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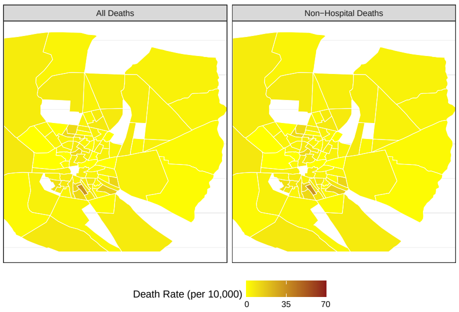
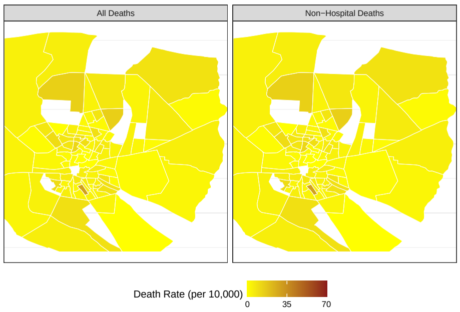
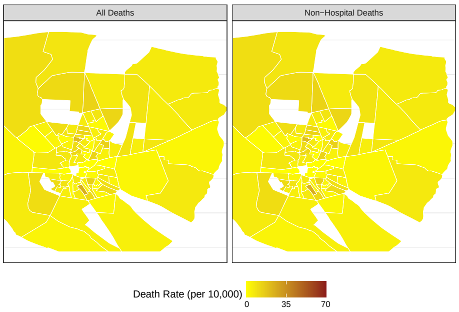


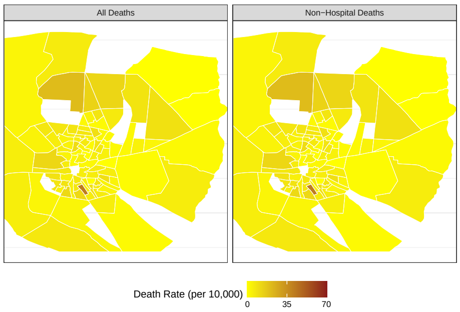
Week 2 1917



Week 3 1917



Week 4 1917



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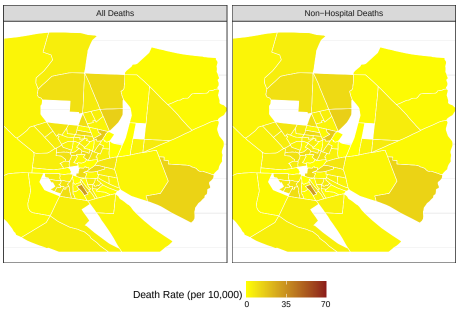
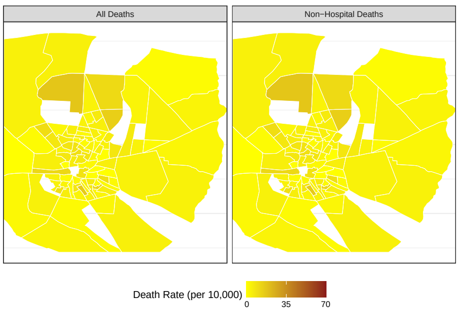
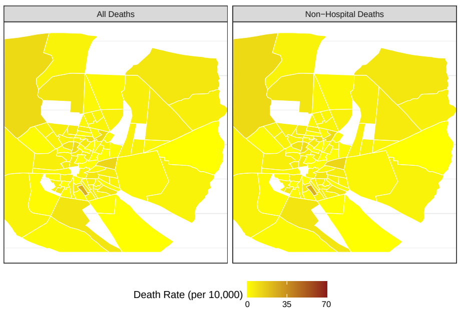


Week 6 1917

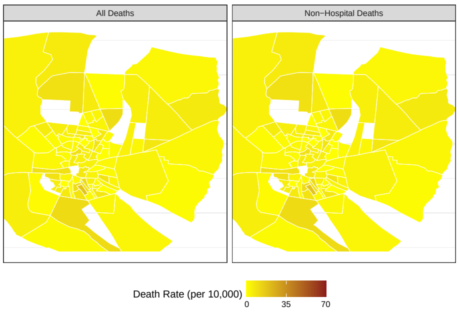
Week 7 1917



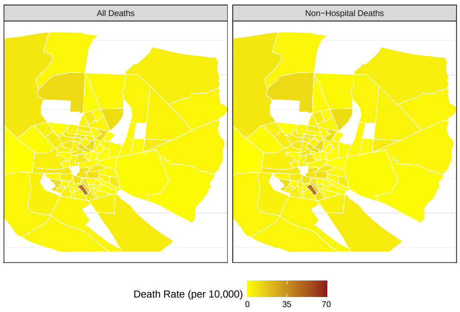
Week 8 1917



Week 9 1917



Week 10 1917



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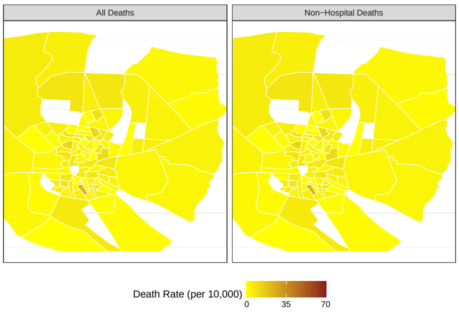
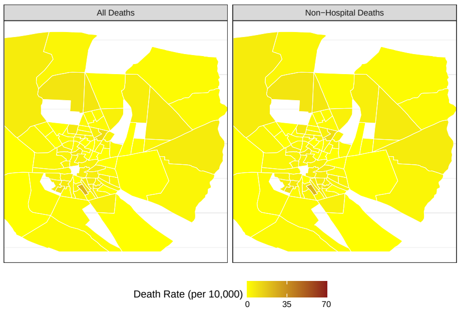


Week 12 1917



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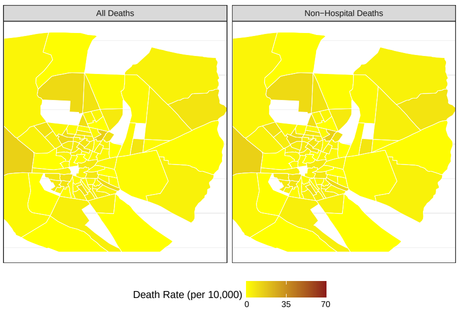
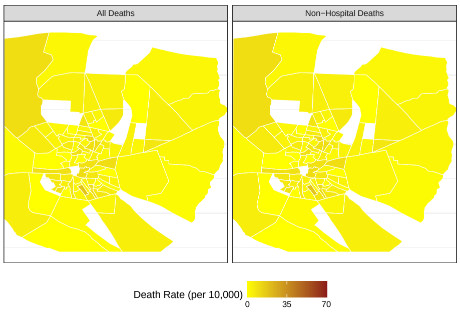
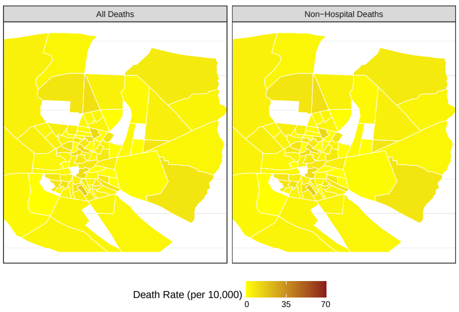


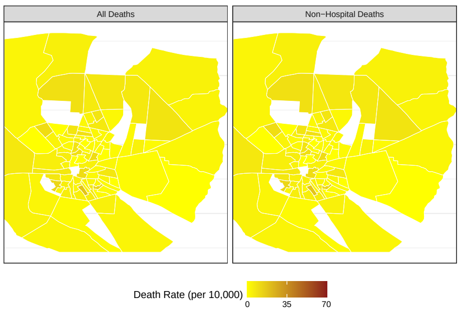
Week 14 1917



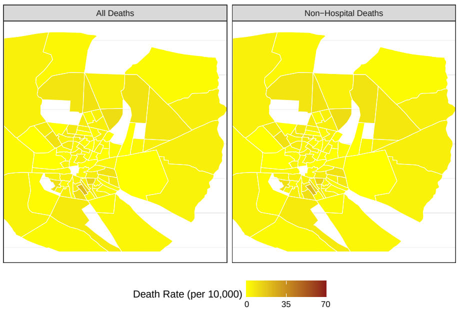
Week 15 1917



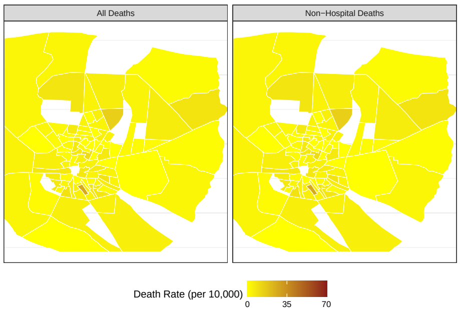
Week 16 1917



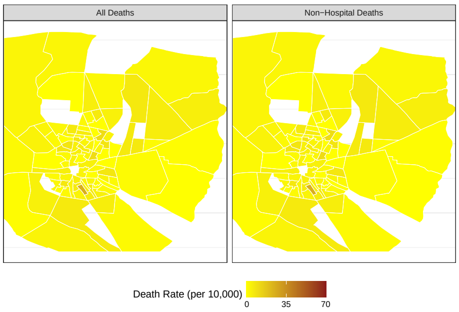
Week 17 1917



Week 18 1917



Week 19 1917



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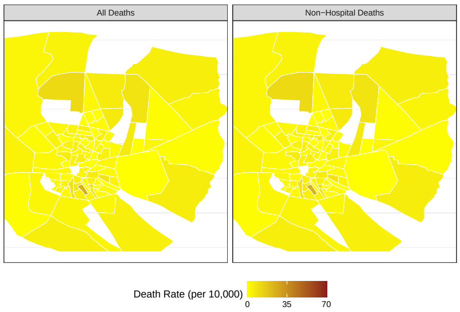
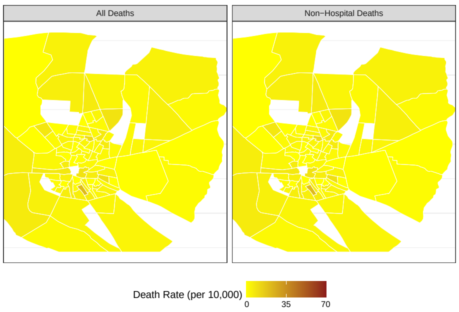
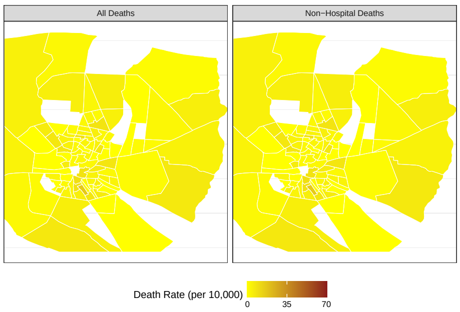


Week 21 1917



Week 22 1917



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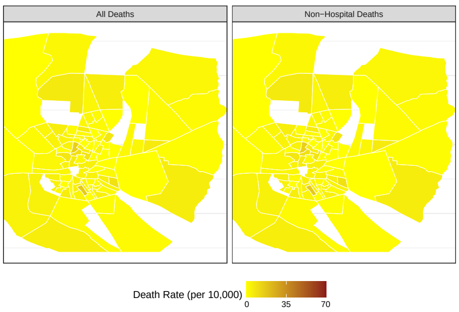
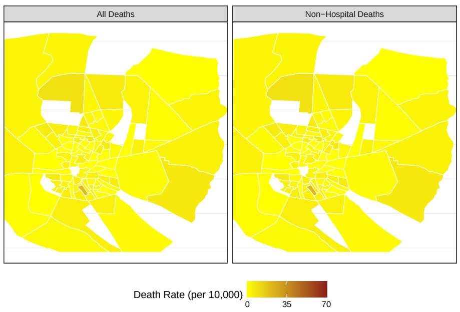


Week 24 1917



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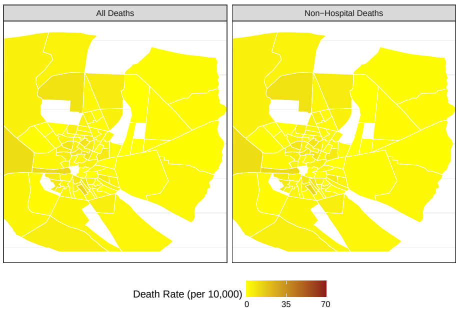

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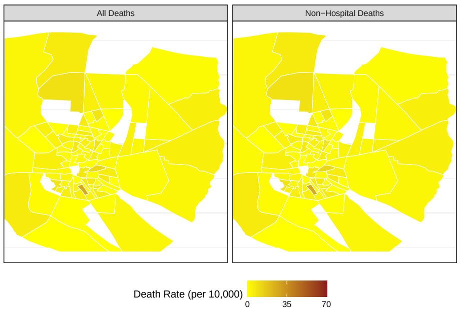

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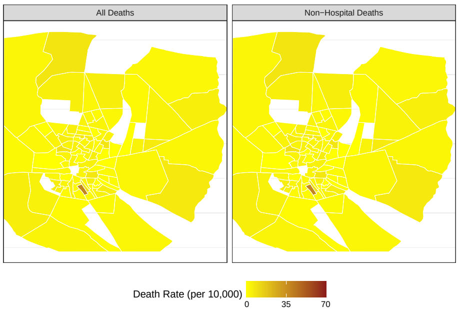
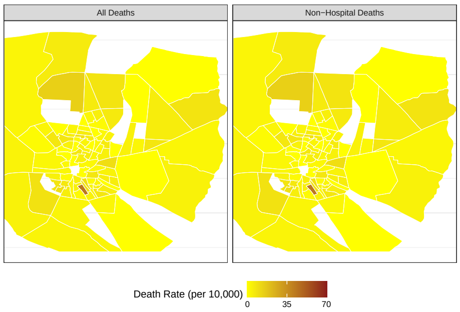


Week 28 1917



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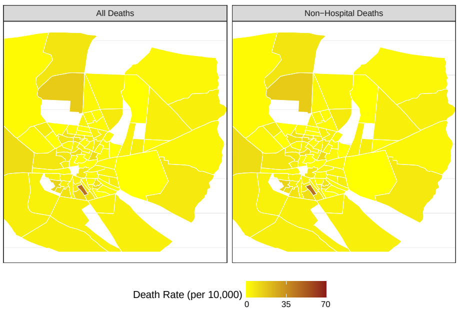
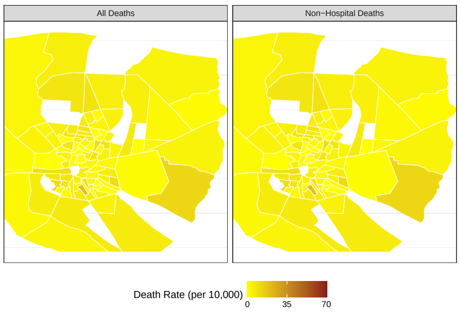


Week 30 1917



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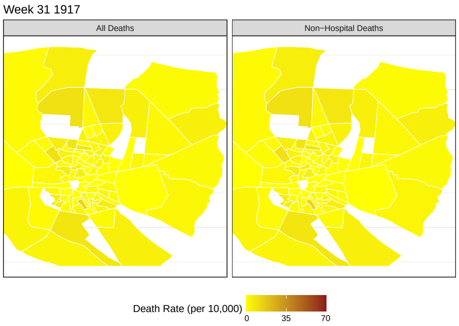
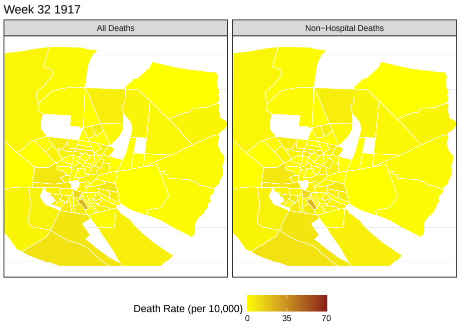
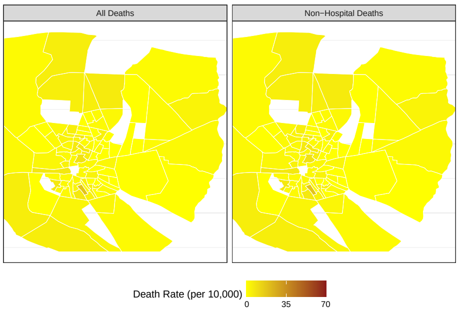


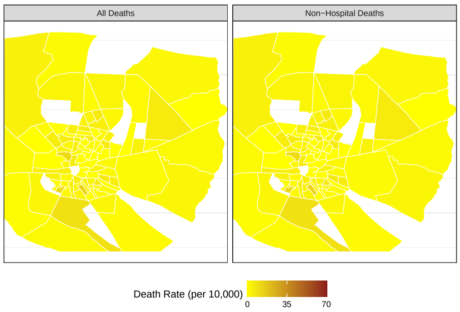
Week 32 1917



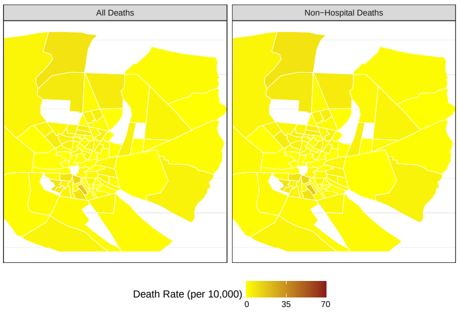
Week 33 1917



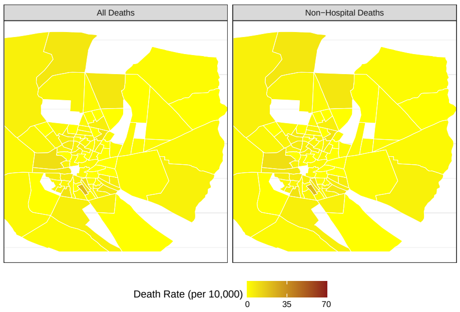
Week 34 1917



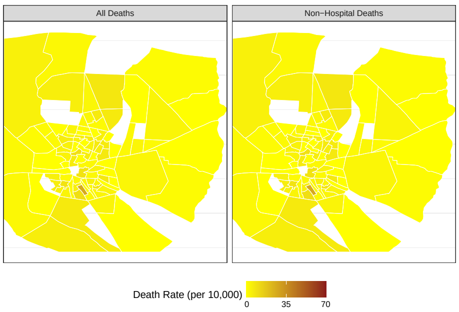
Week 35 1917



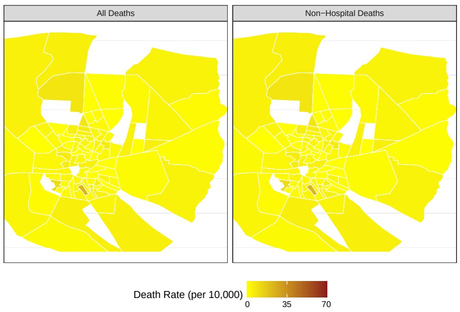
Week 36 1917



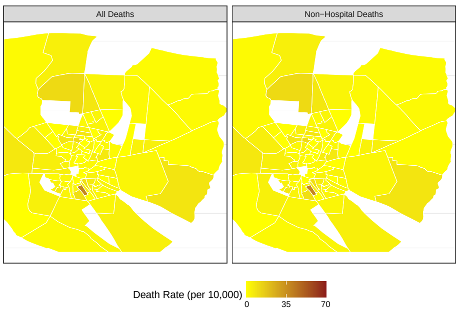
Week 37 1917



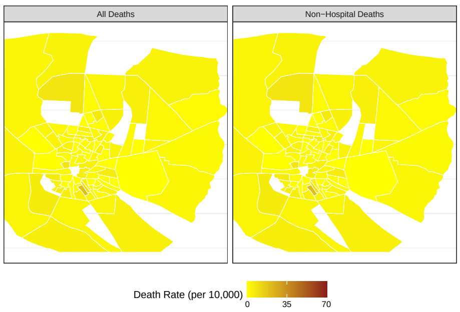
Week 38 1917



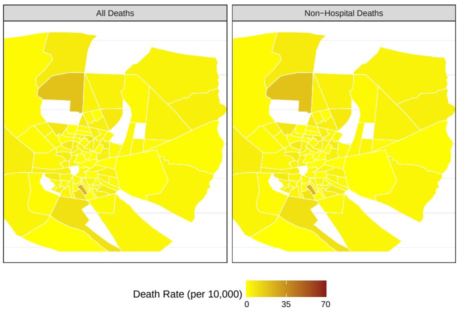
Week 39 1917



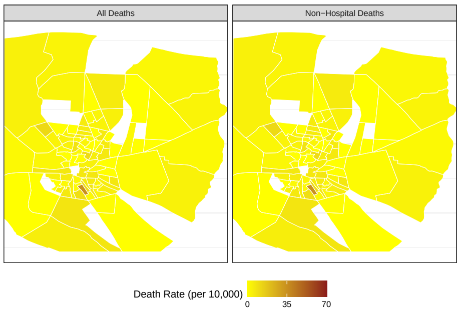
Week 40 1917



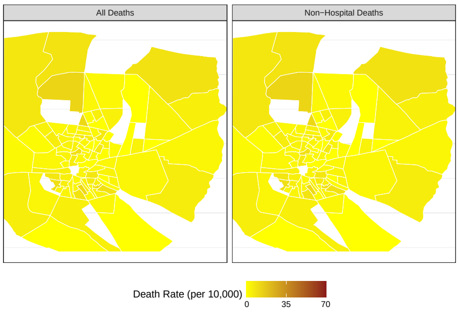
Week 41 1917



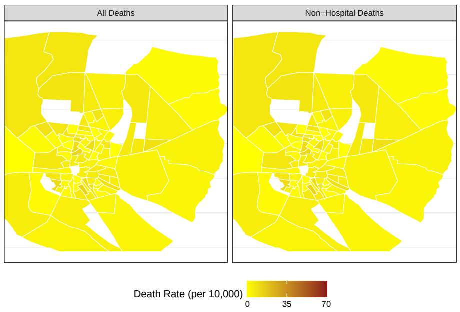
Week 42 1917



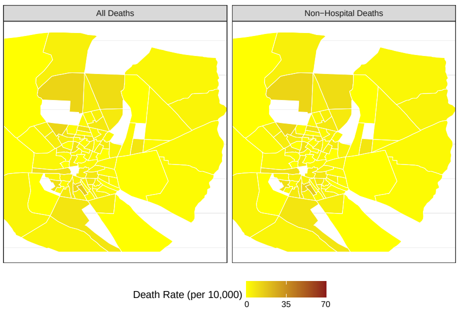
Week 43 1917



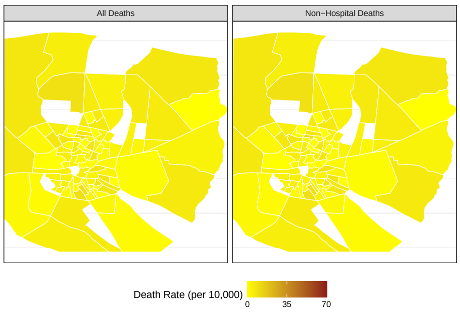
Week 44 1917



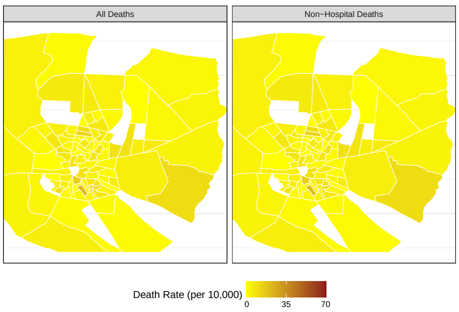
Week 45 1917



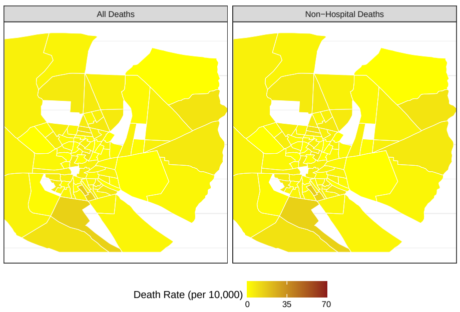
Week 46 1917

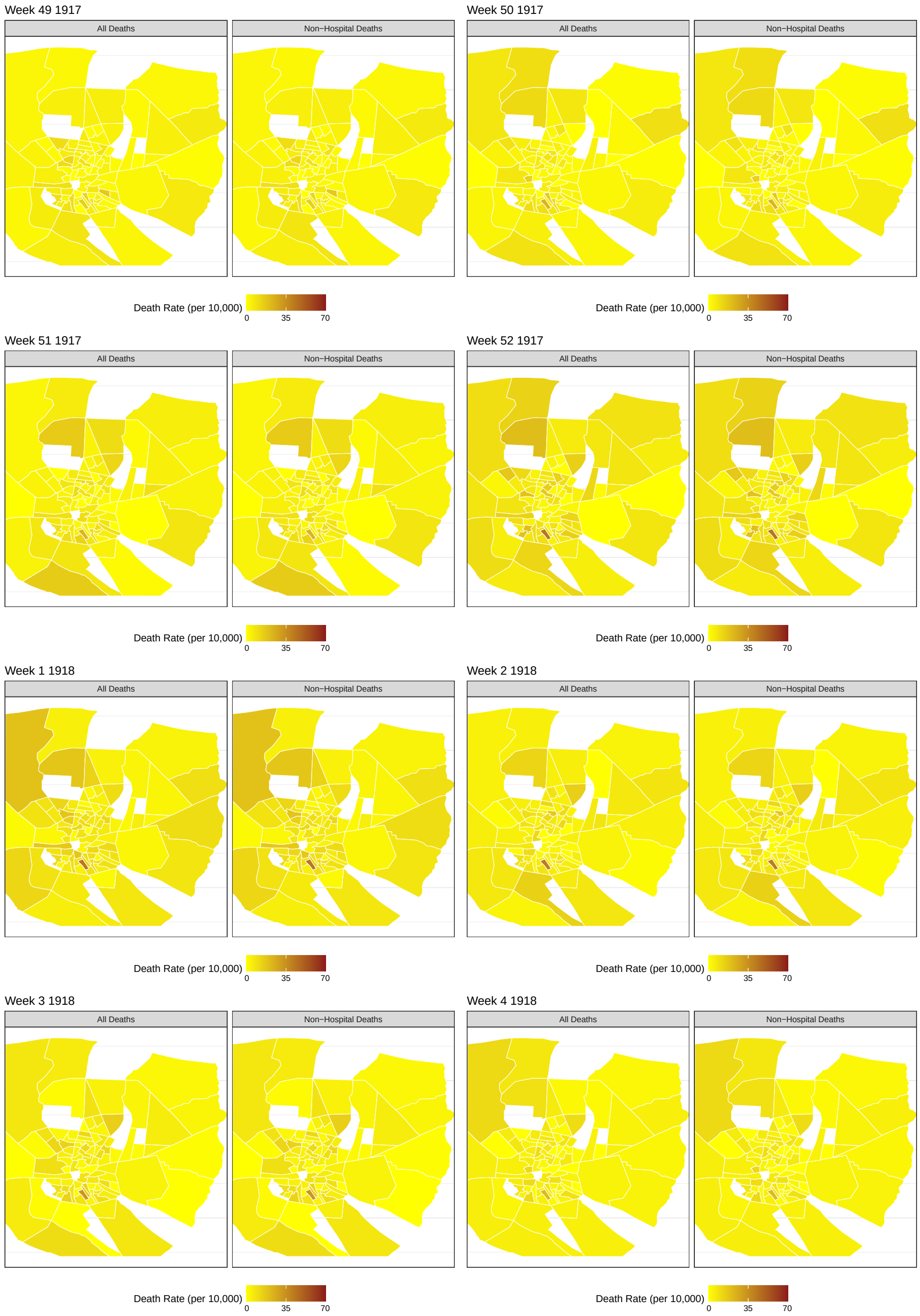


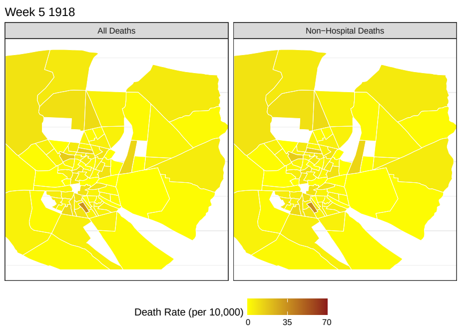
Week 47 1917

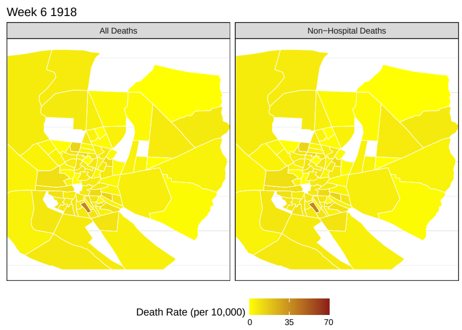


Week 48 1917




Week 49 1917
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 50 1917
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 51 1917
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 52 1917
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 1 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 2 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 3 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70
Week 4 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0 35 70


Week 5 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70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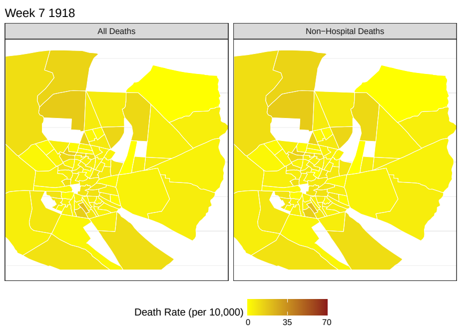
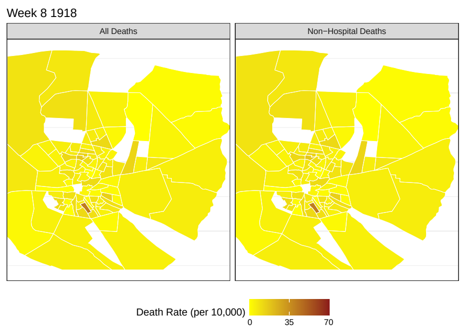
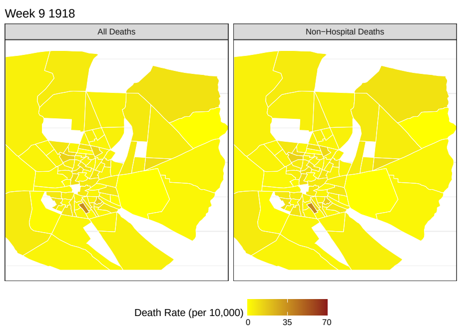
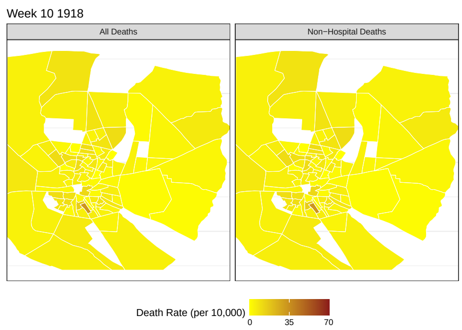
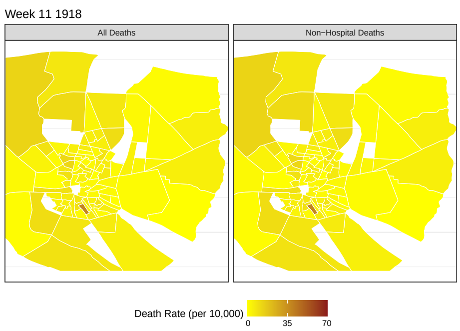
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

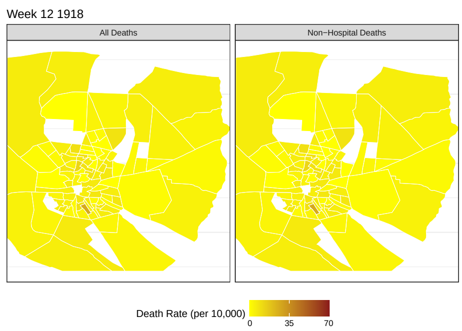

Week 7 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

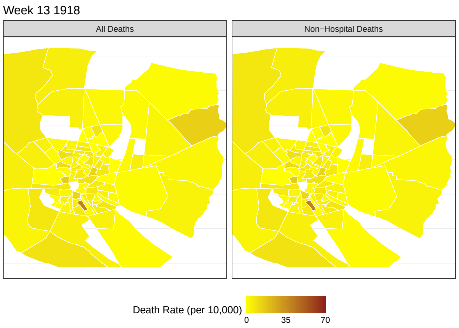

Week 8 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

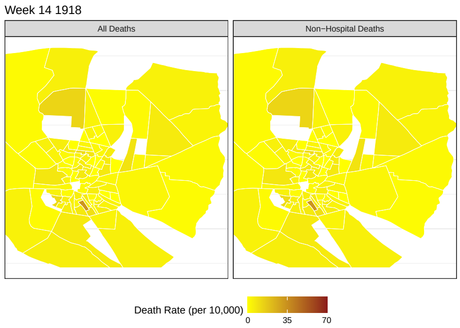

Week 9 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

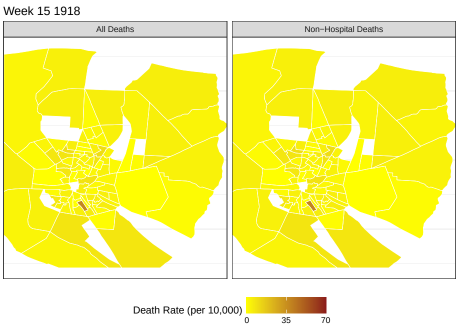

Week 10 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

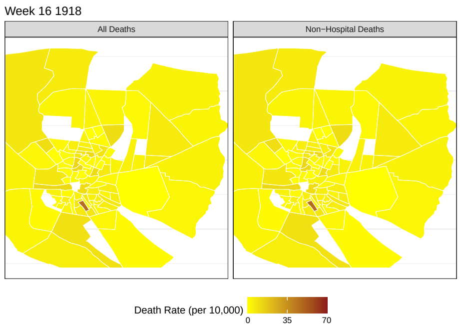

Week 11 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

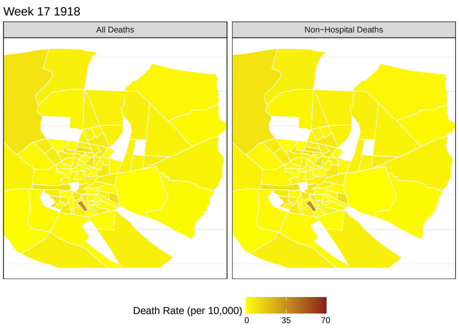

Week 12 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

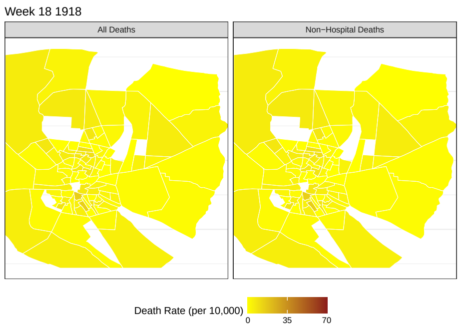

Week 13 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

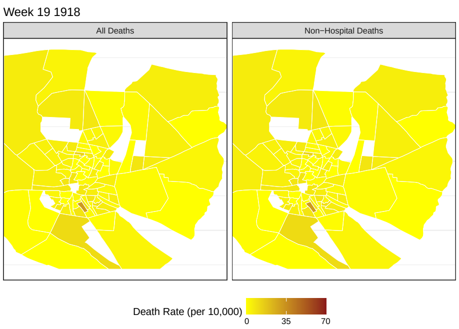

Week 14 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

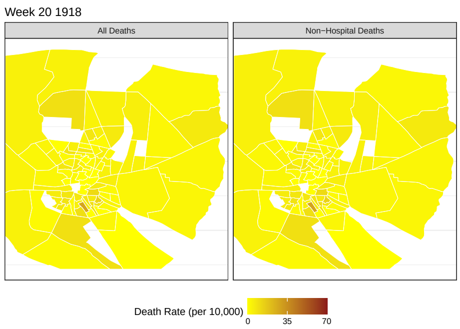

Week 15 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70


Week 16 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

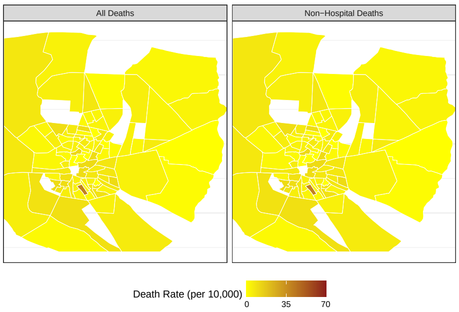

Week 17 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70


Week 18 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

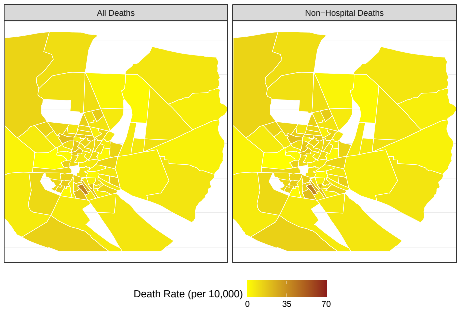

Week 19 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70


Week 20 1918
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

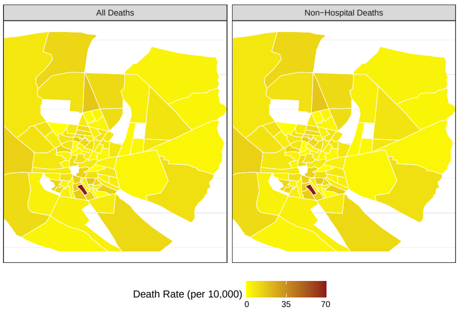
Week 21 1918



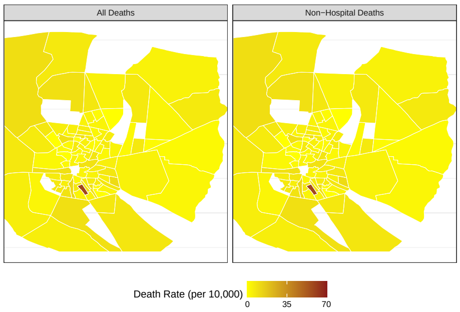
Week 22 1918



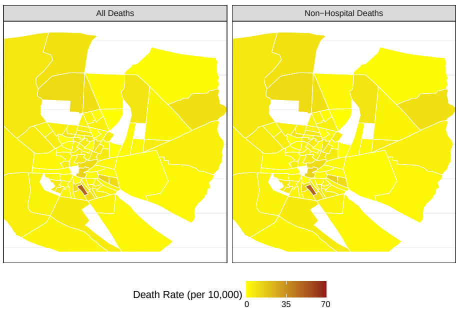
Week 23 1918



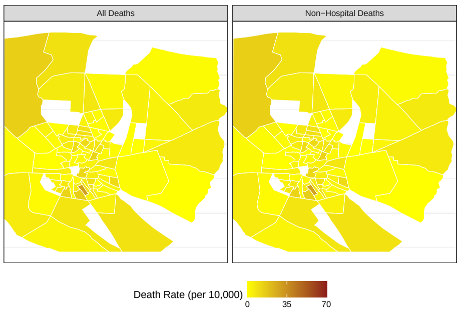
Week 24 1918



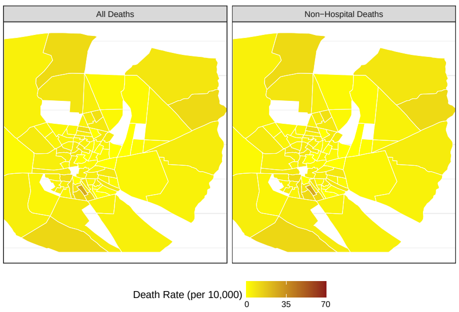
Week 25 1918



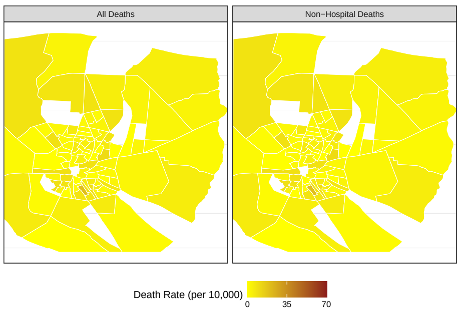
Week 26 1918



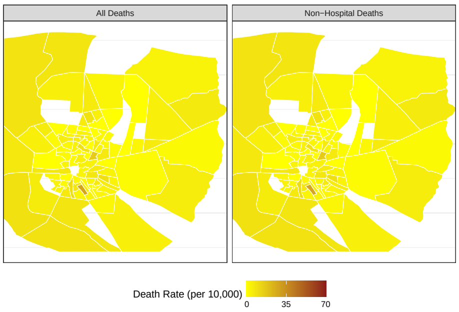
Week 27 1918



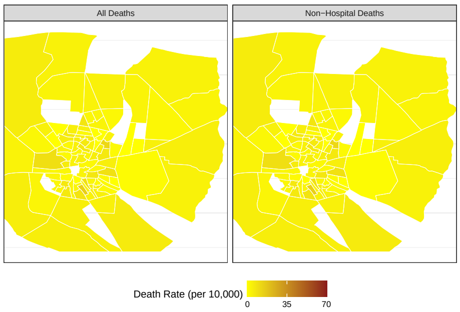
Week 28 1918



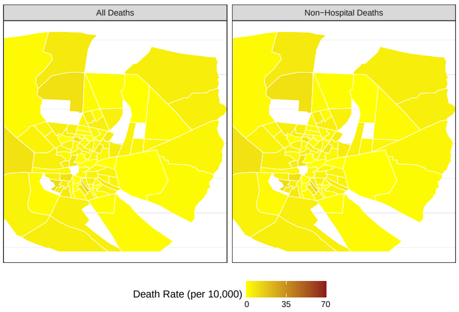
Week 29 1918



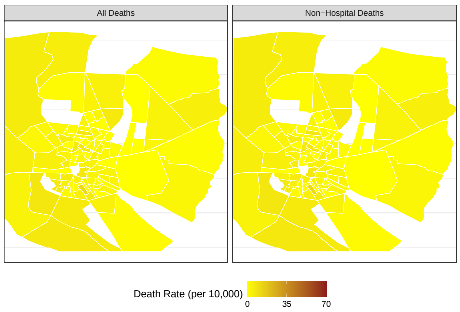
Week 30 1918



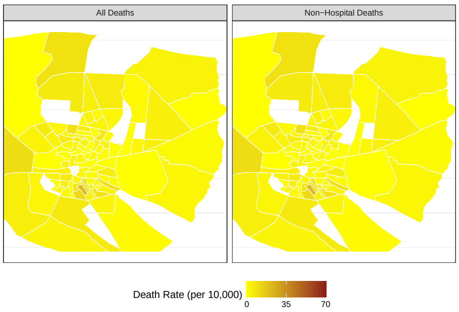
Week 31 1918



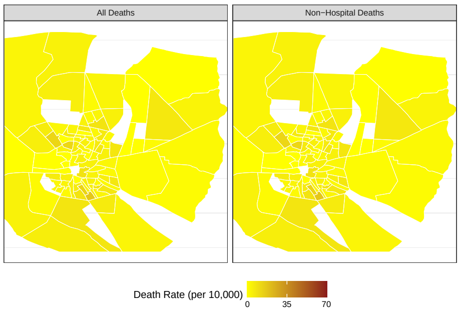
Week 32 1918



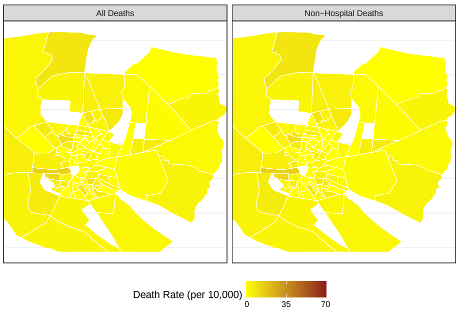
Week 33 1918



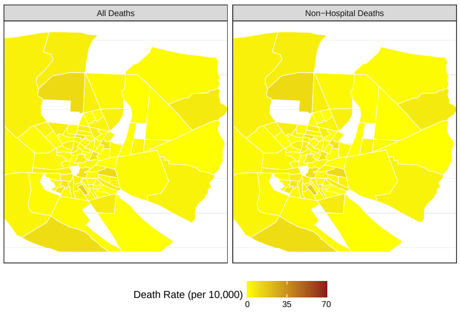
Week 34 1918



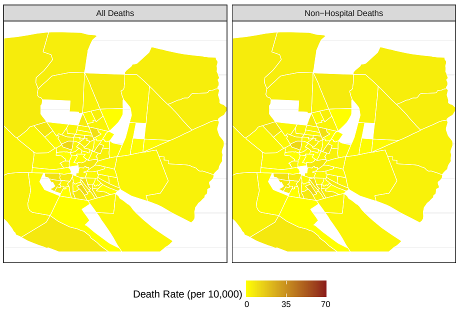
Week 35 1918



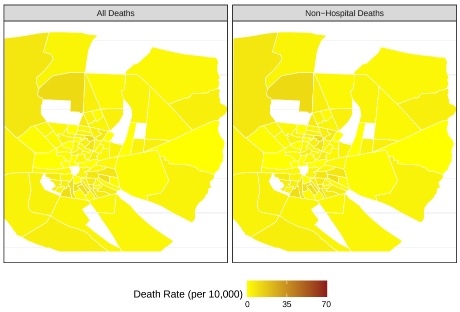
Week 36 1918



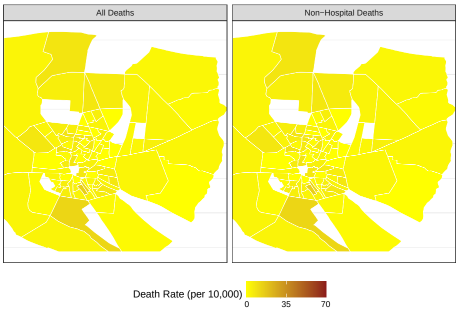
Week 37 1918



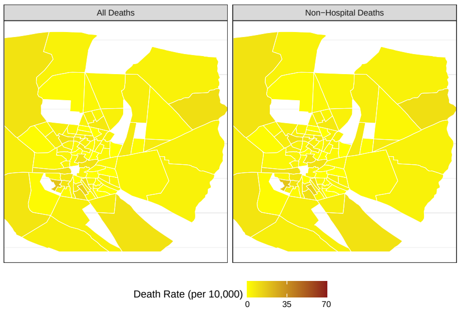
Week 38 1918



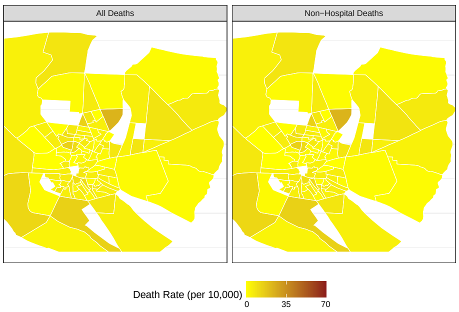
Week 39 1918



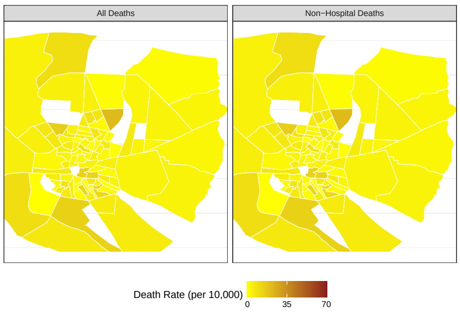
Week 40 1918



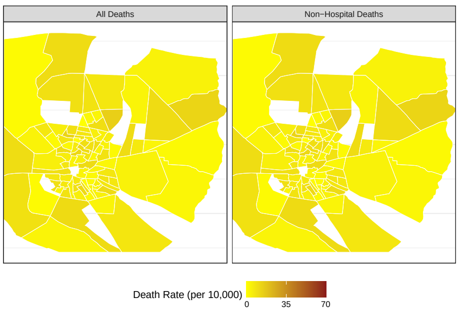
Week 41 1918



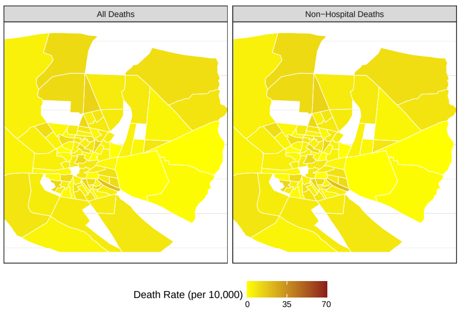
Week 42 1918



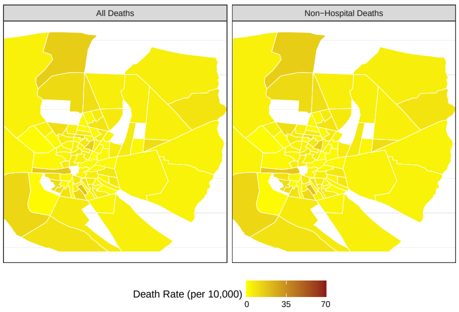
Week 43 1918



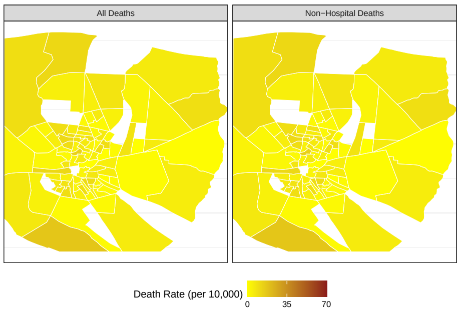
Week 44 1918



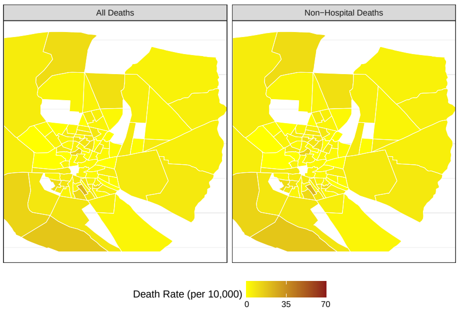
Week 45 1918



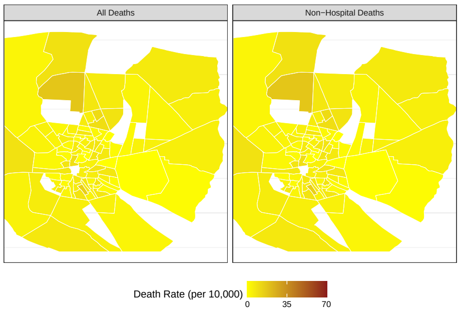
Week 46 1918



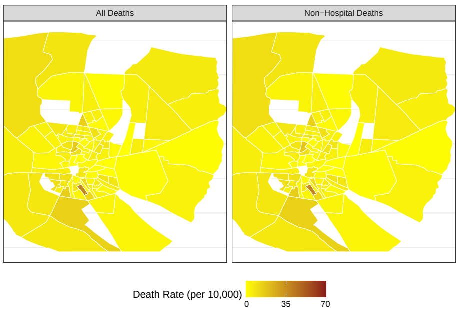
Week 47 1918



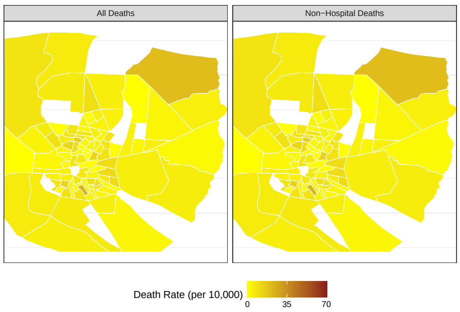
Week 48 1918



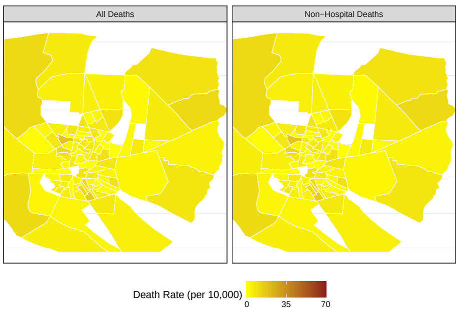
Week 49 1918



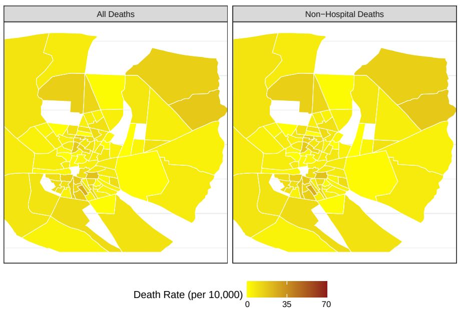
Week 50 1918



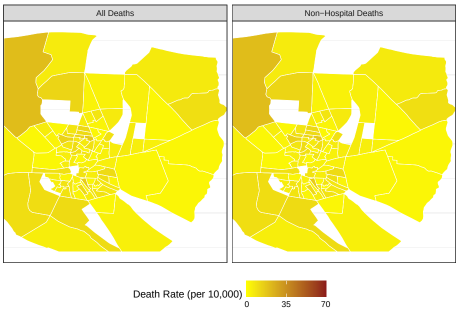
Week 51 1918



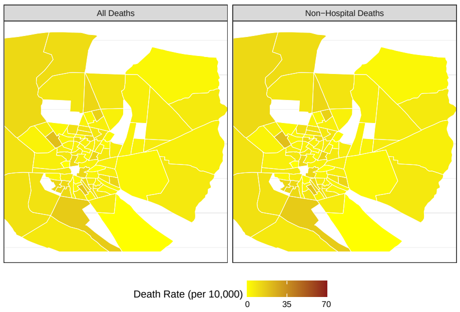
Week 52 1918



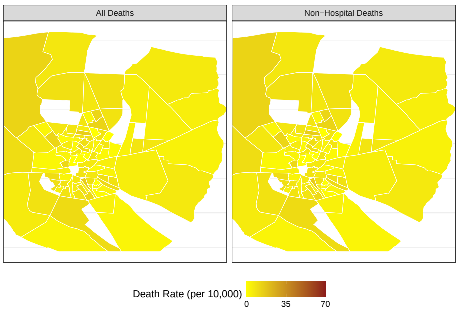
Week 1 1919



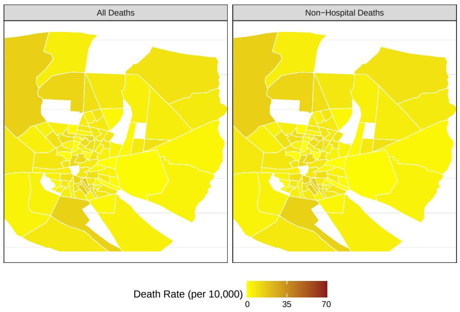
Week 2 1919



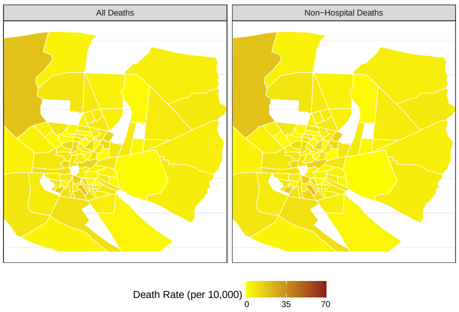
Week 3 1919



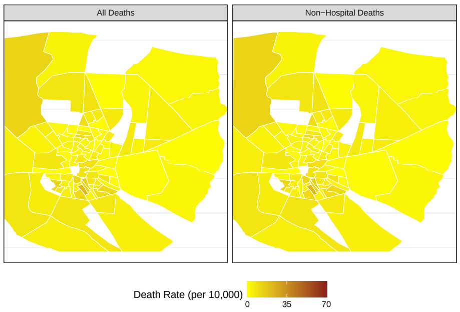
Week 4 1919



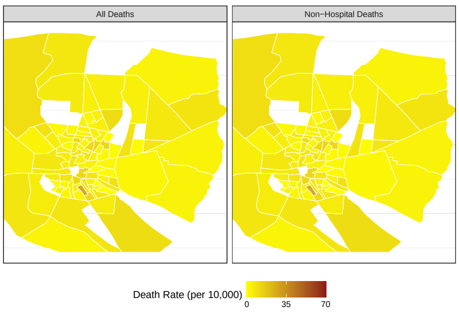
Week 5 1919



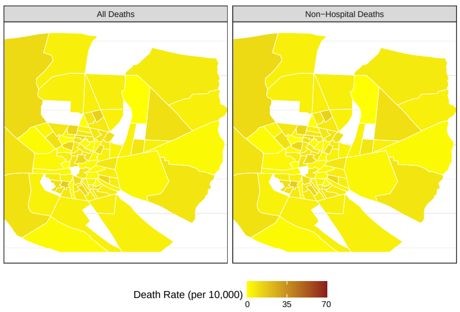
Week 6 1919



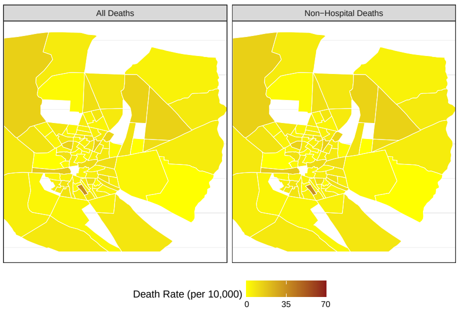
Week 7 1919



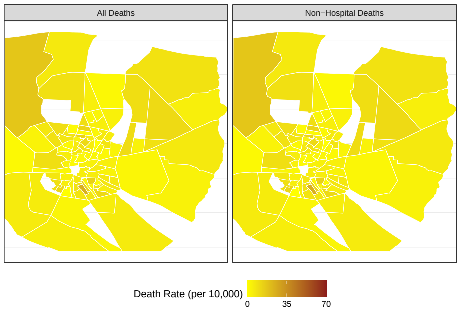
Week 8 1919



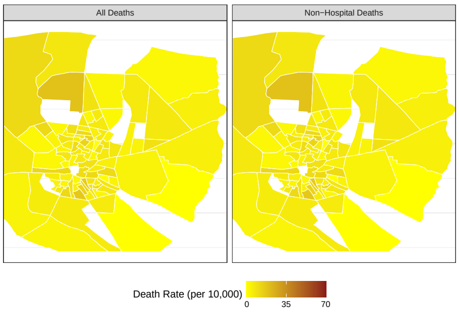
Week 9 1919



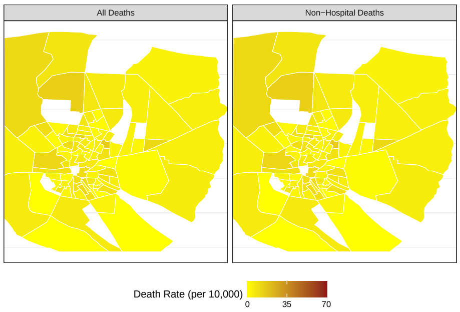
Week 10 1919



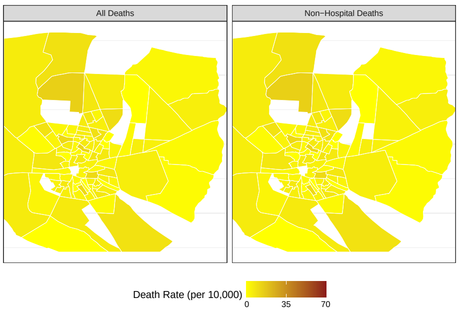
Week 11 1919



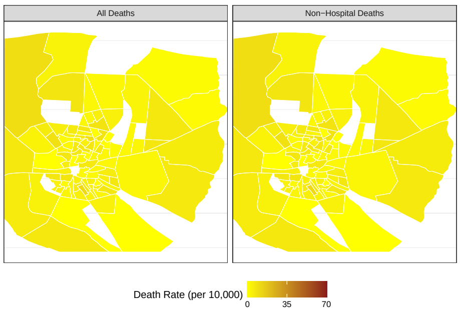
Week 12 1919



Week 13 1919



Week 14 1919



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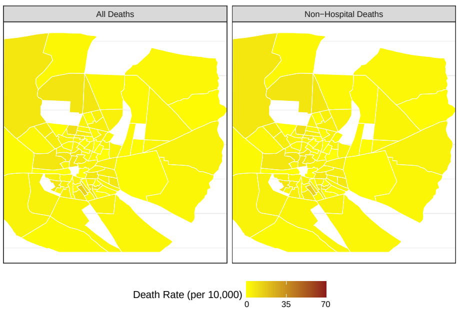
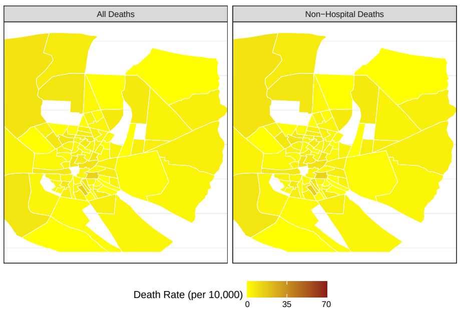
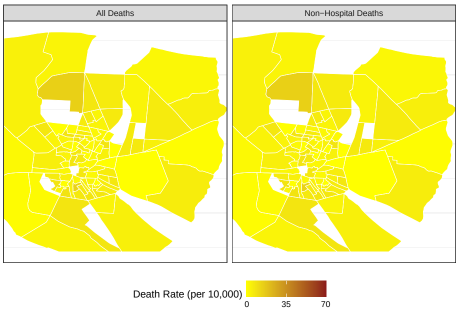


Week 16 1919



Week 17 1919



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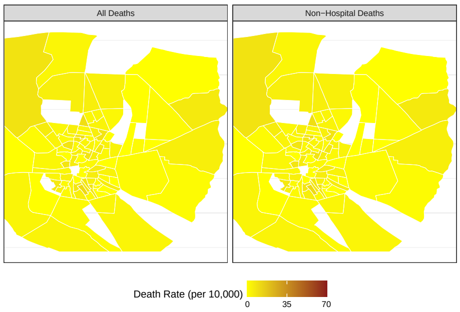
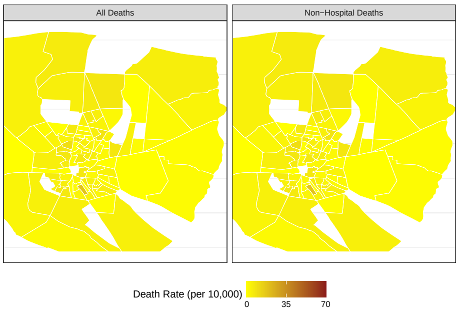


Week 19 1919



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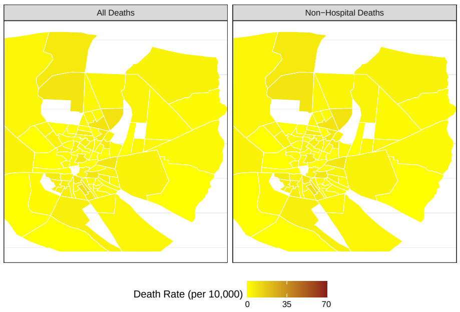

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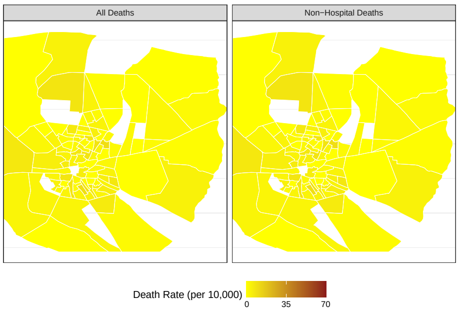

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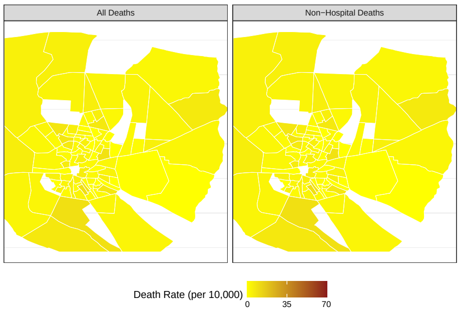
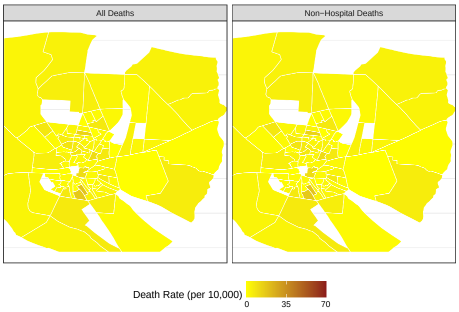
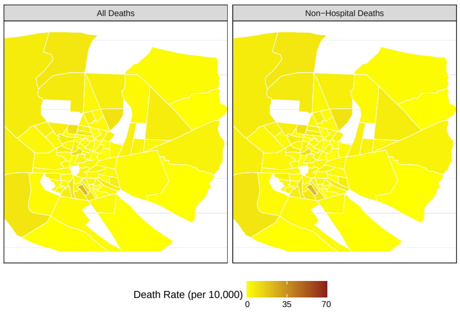


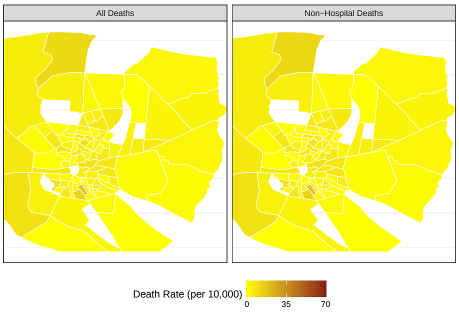
Week 23 1919



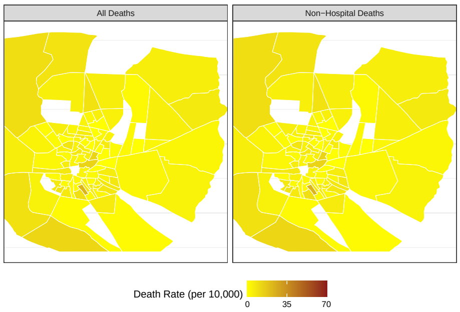
Week 24 1919



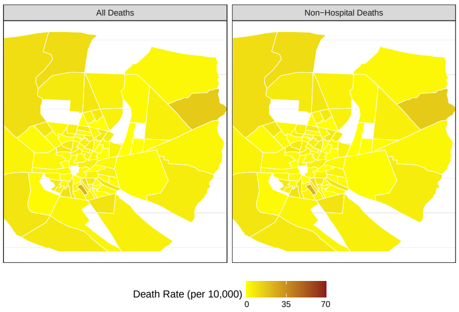
Week 25 1919



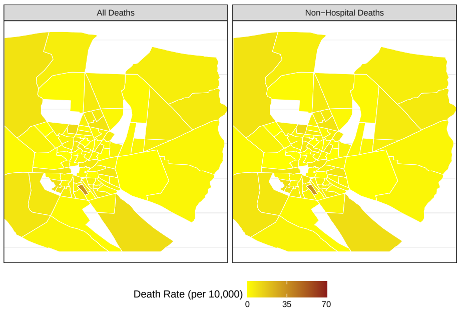
Week 26 1919



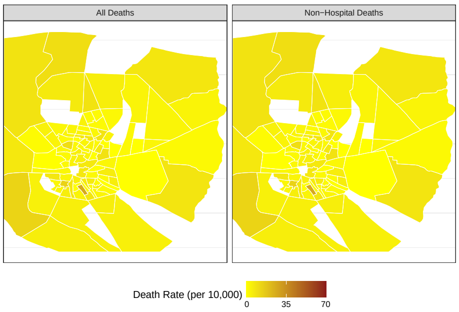
Week 27 1919



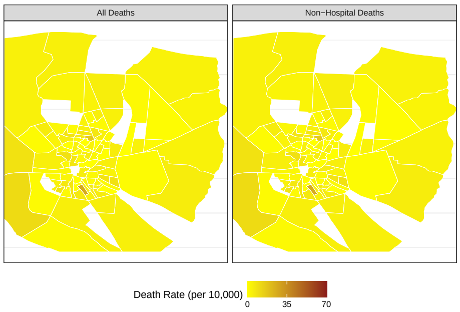
Week 28 1919



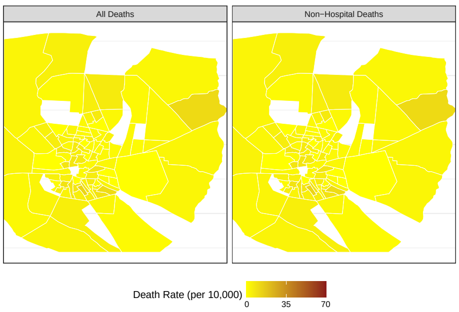
Week 29 1919



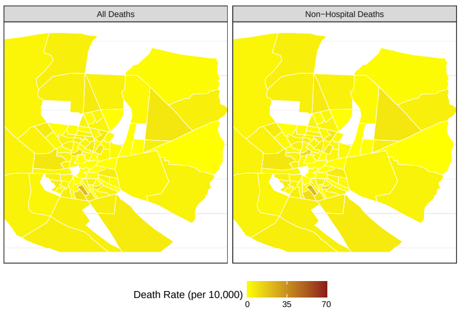
Week 30 1919



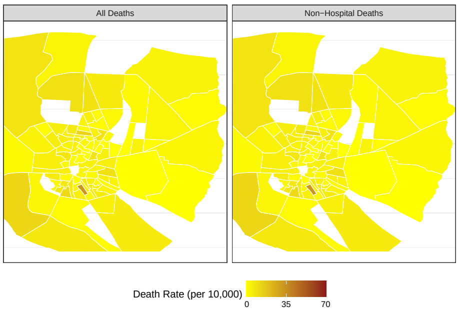
Week 31 1919



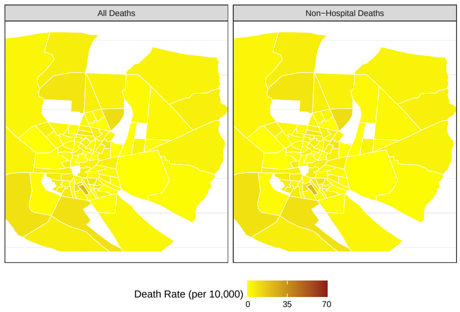
Week 32 1919



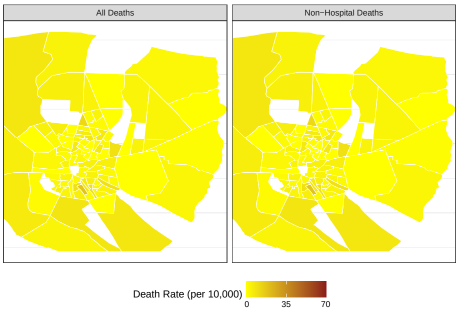
Week 33 1919



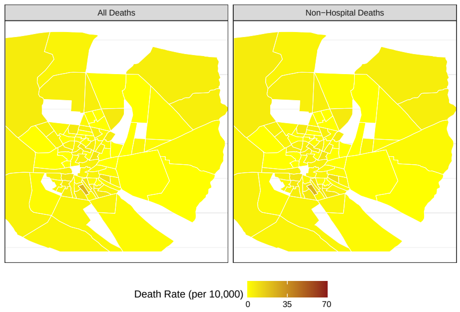
Week 34 1919



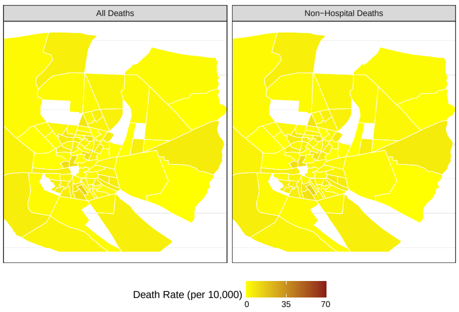
Week 35 1919



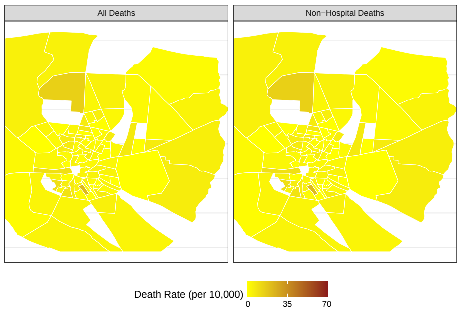
Week 36 1919



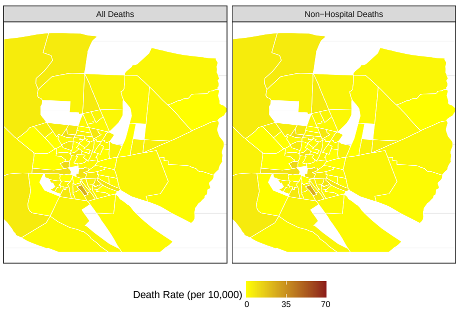
Week 37 1919



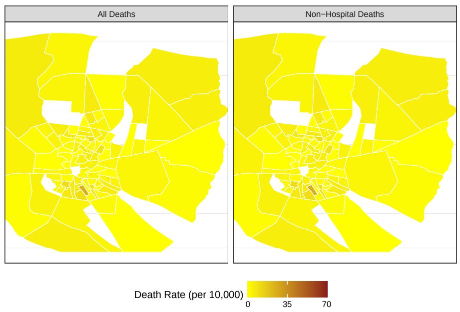
Week 38 1919



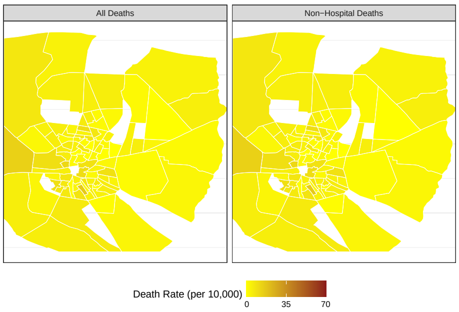
Week 39 1919



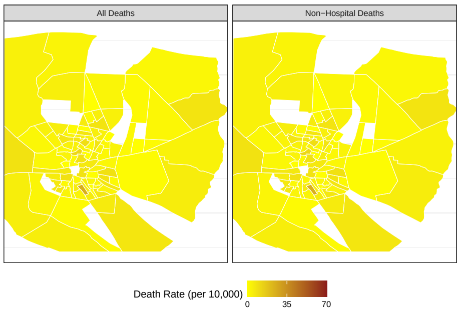
Week 40 1919



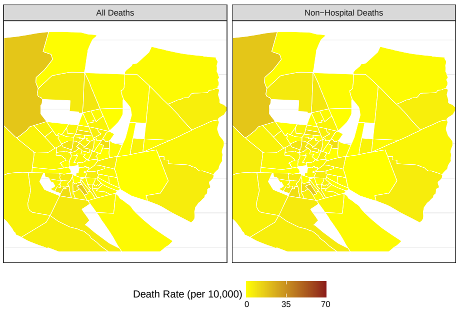
Week 41 1919



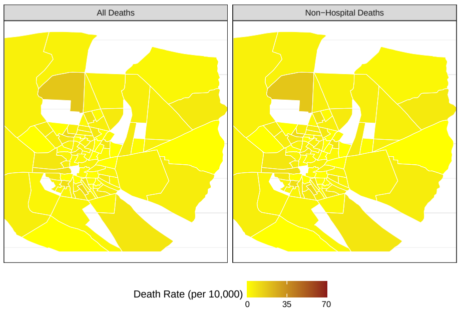
Week 42 1919



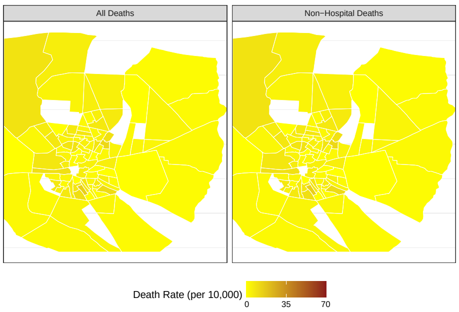
Week 43 1919



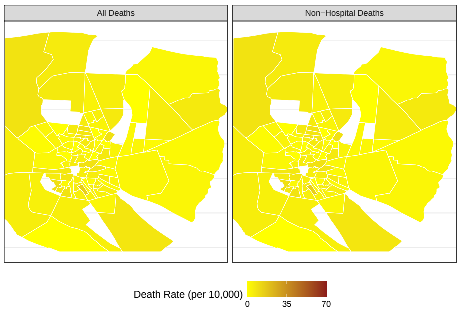
Week 44 1919



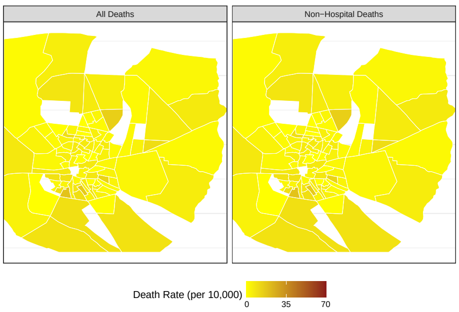
Week 45 1919



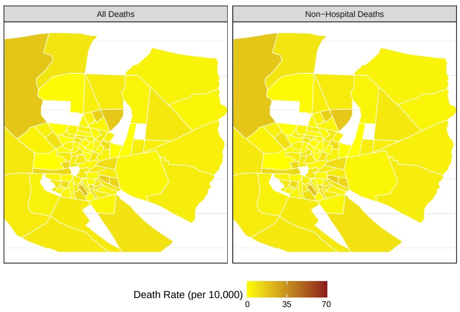
Week 46 1919

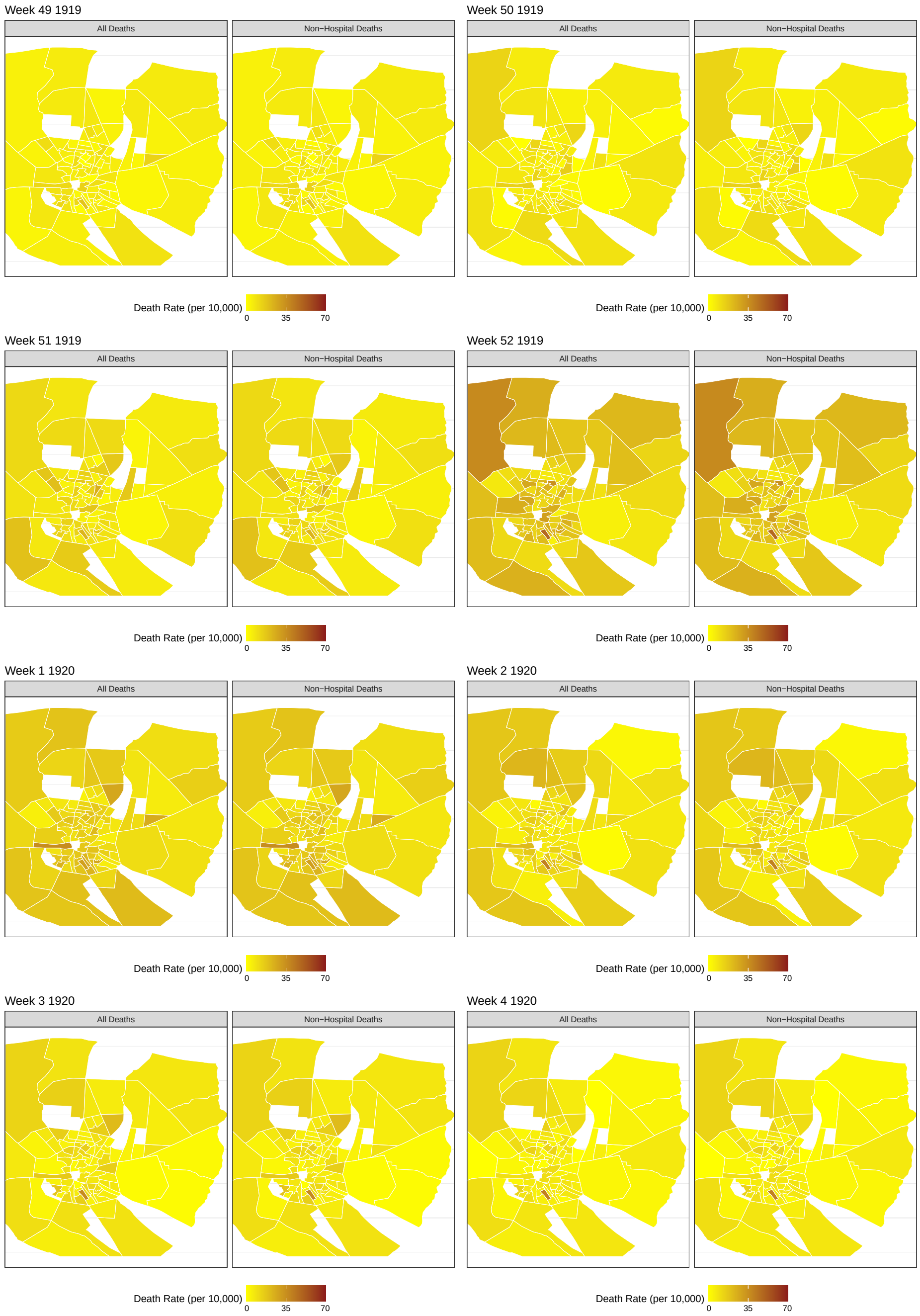


Week 47 1919

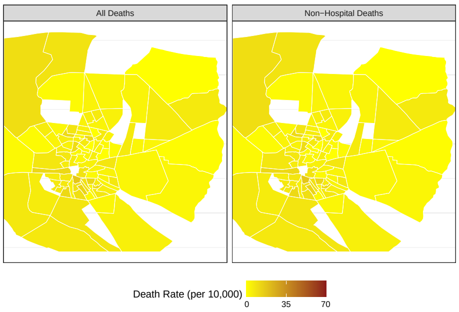


Week 48 1919

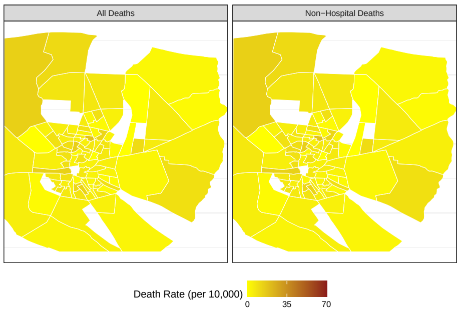



Week 49 1919
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 50 1919
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 51 1919
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 52 1919
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 1 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 2 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 3 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70
Week 4 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

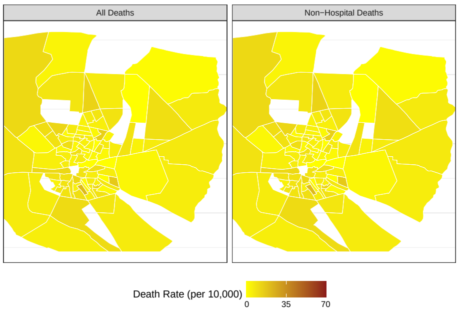
Week 5 1920



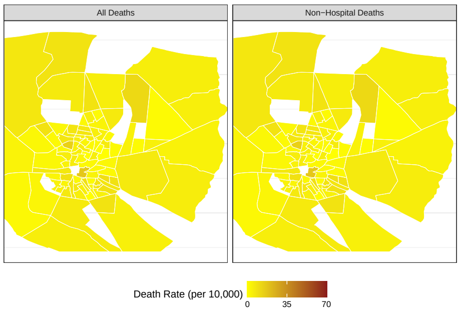
Week 6 1920



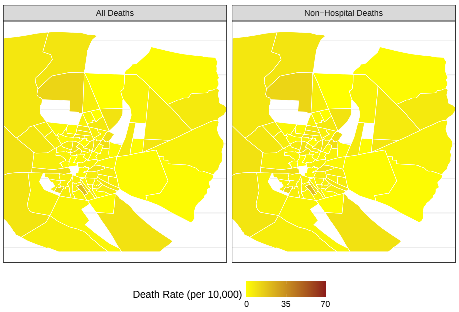
Week 7 1920



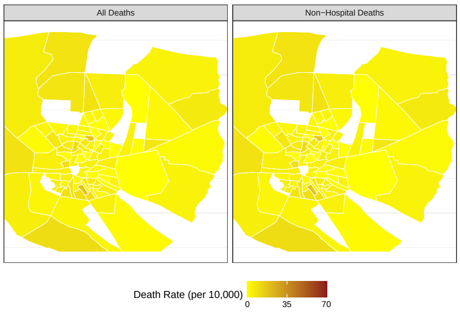
Week 8 1920



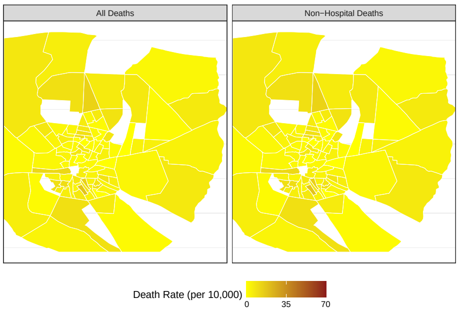
Week 9 1920



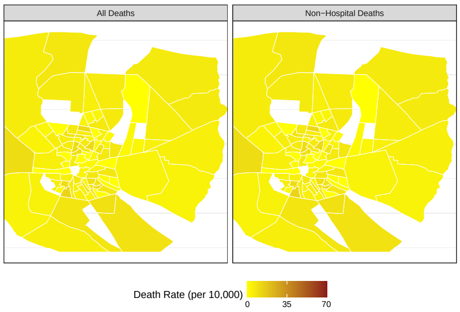
Week 10 1920



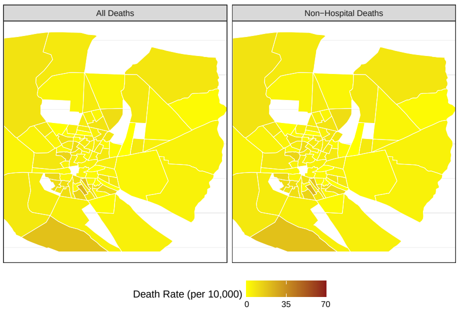
Week 11 1920



Week 12 1920

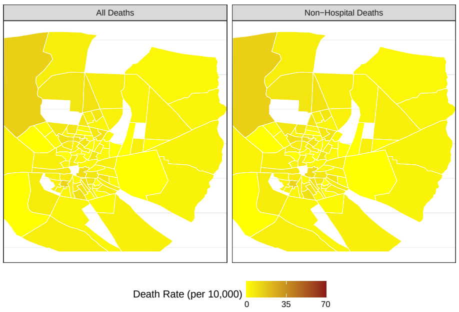


Week 13 1920

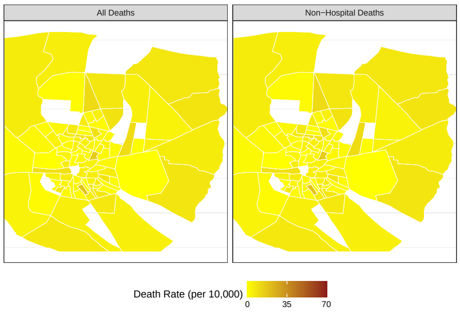


Week 14 1920

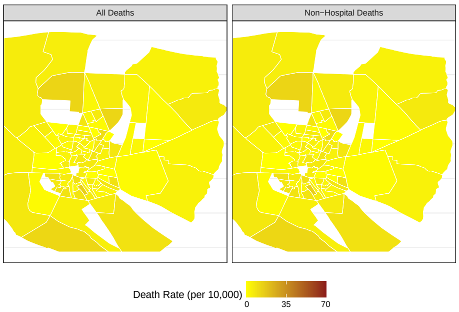
Week 15 1920



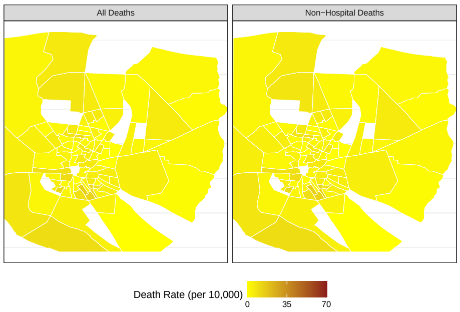
Week 16 1920



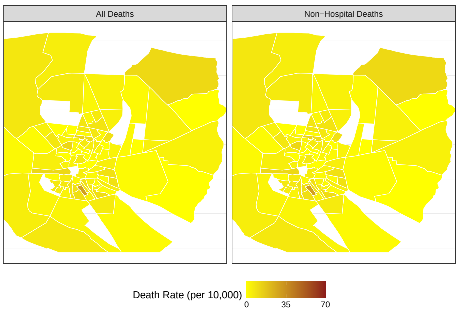
Week 17 1920



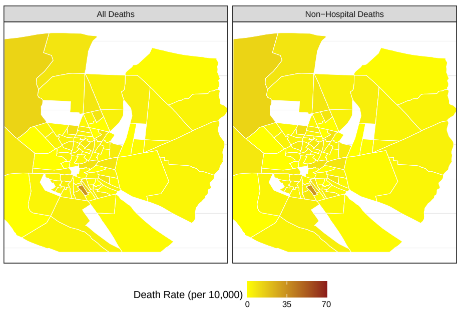
Week 18 1920

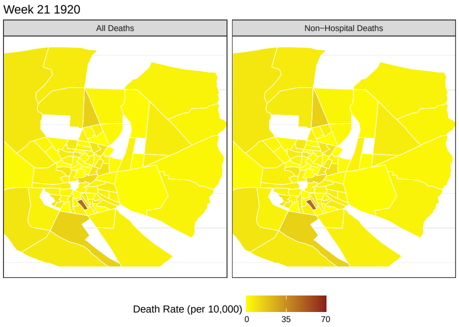
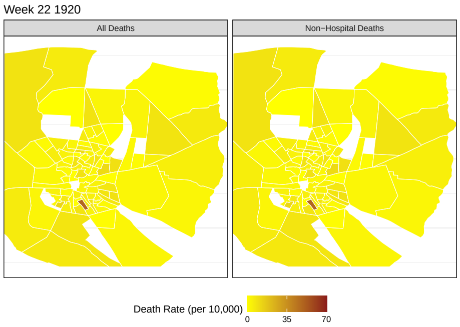
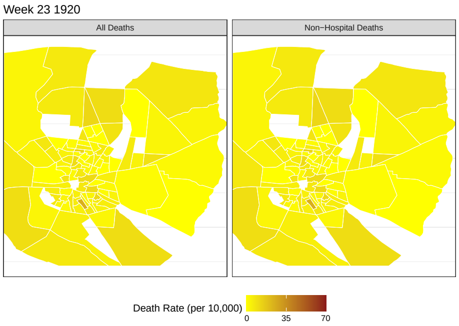
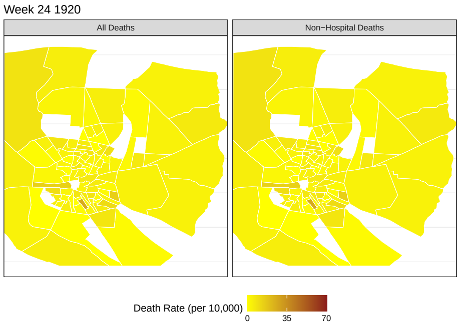
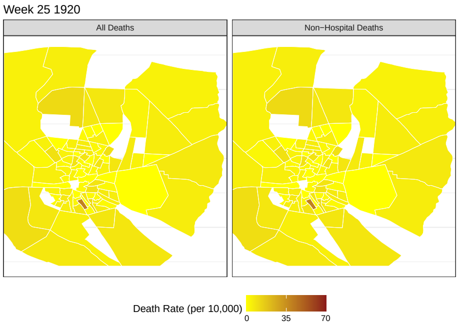
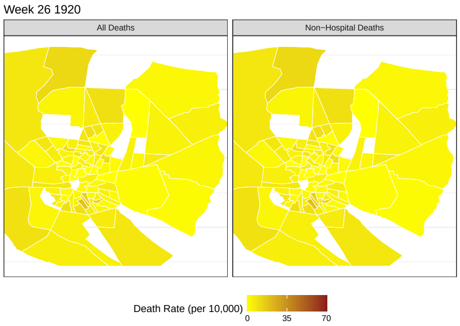
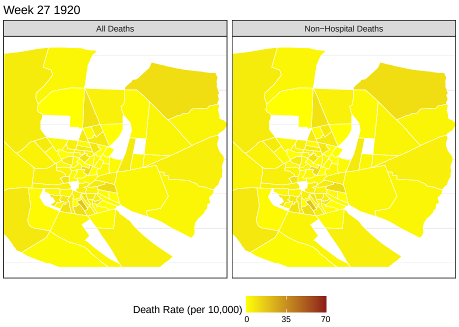
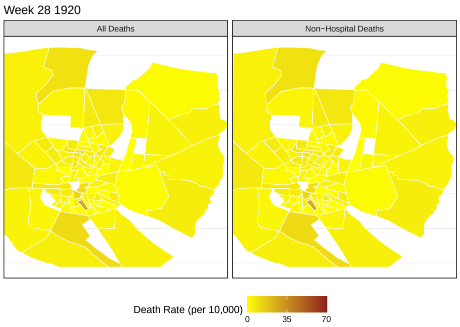


Week 19 1920

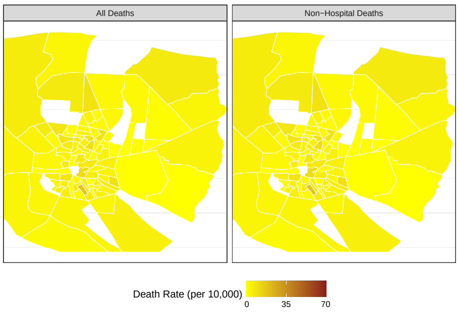


Week 20 1920

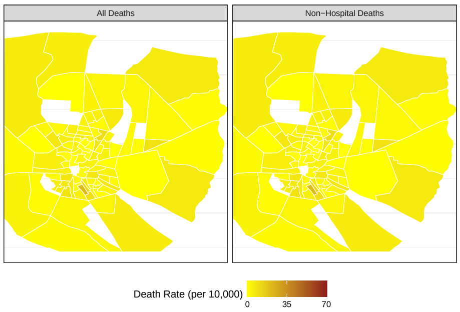



Week 21 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 22 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 23 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 24 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 25 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 26 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 27 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

Week 28 1920
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

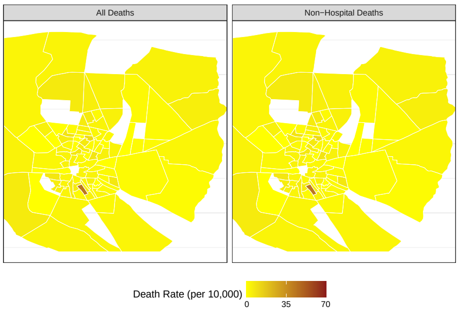
Week 29 1920



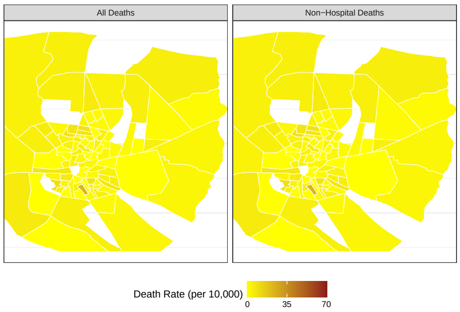
Week 30 1920



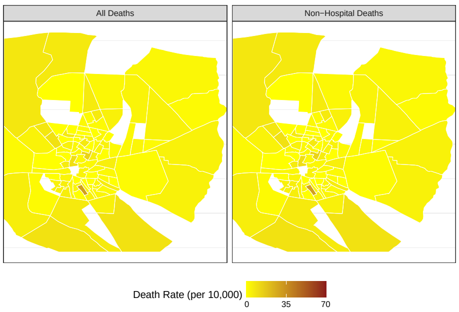
Week 31 1920



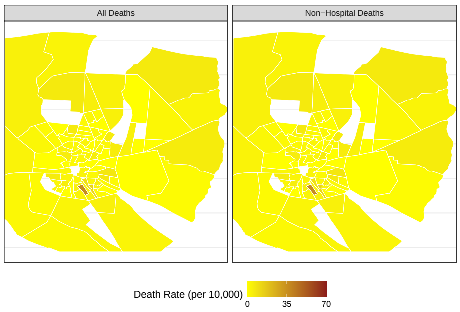
Week 32 1920



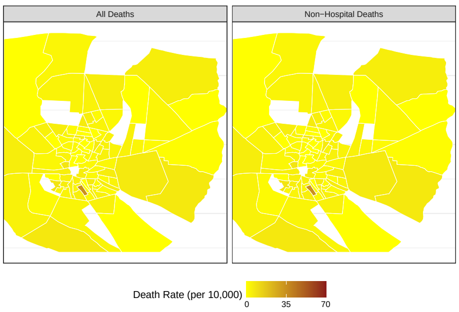
Week 33 1920



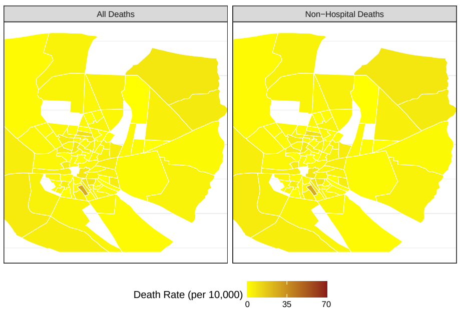
Week 34 1920



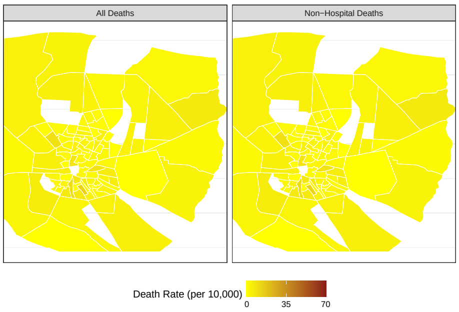
Week 35 1920



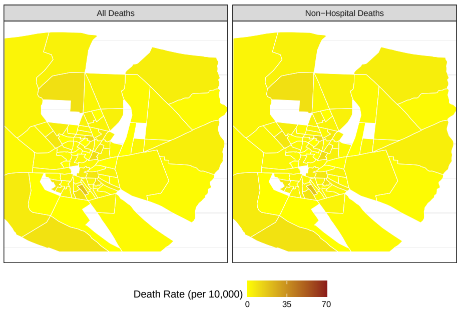
Week 36 1920



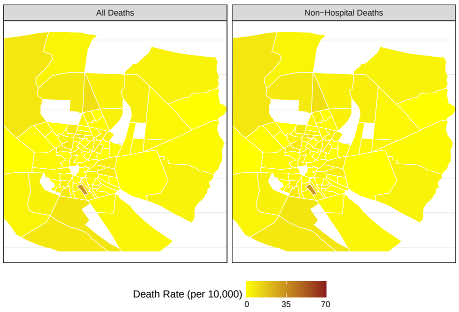
Week 37 1920



Week 38 1920



Week 39 1920



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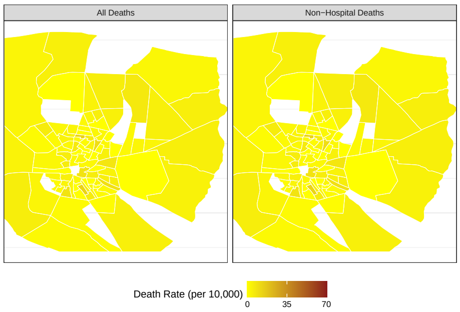
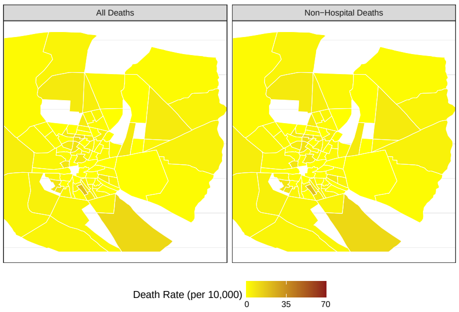
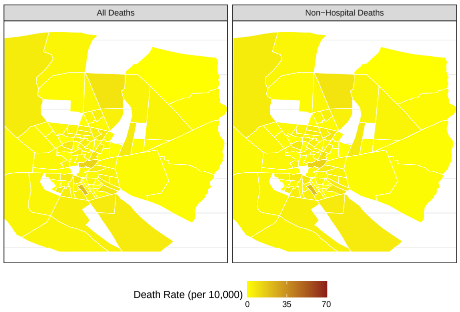


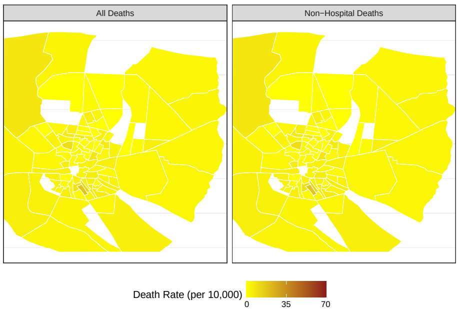
Week 41 1920



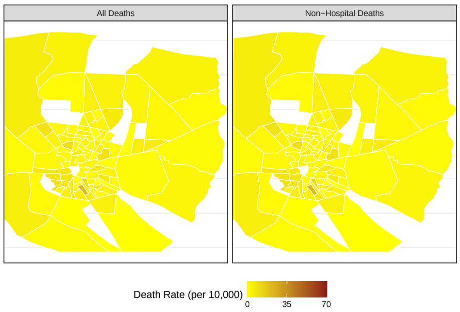
Week 42 1920



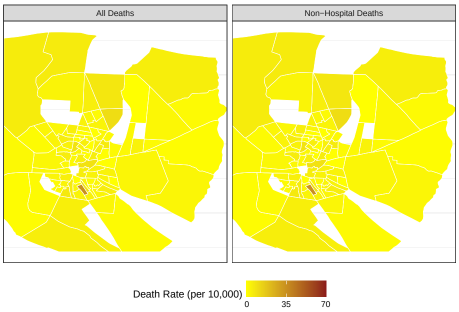
Week 43 1920



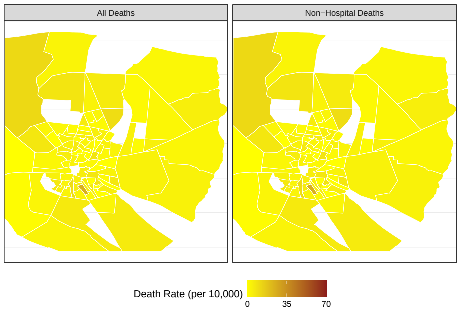
Week 44 1920



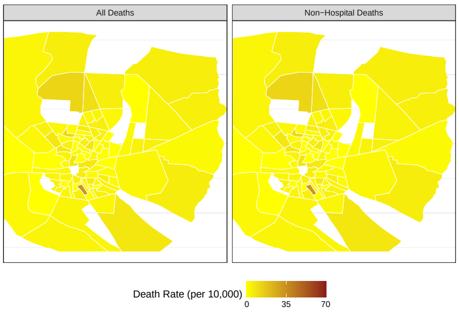
Week 45 1920



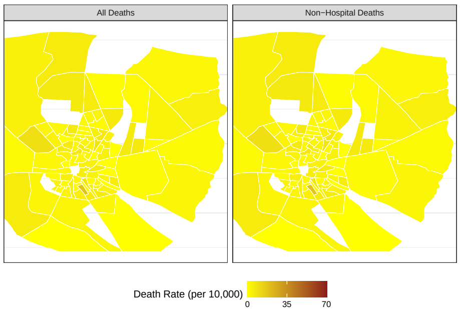
Week 46 1920



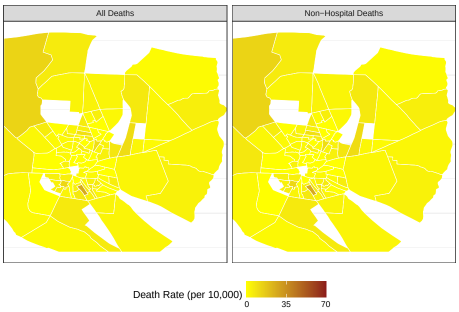
Week 47 1920



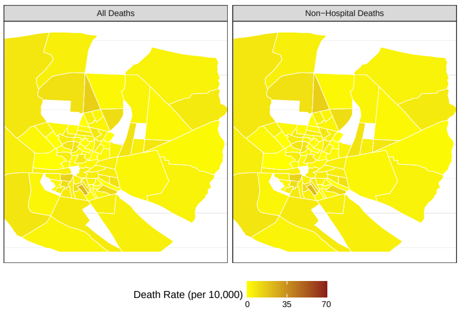
Week 48 1920



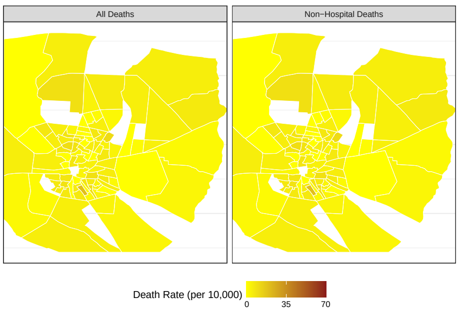
Week 49 1920



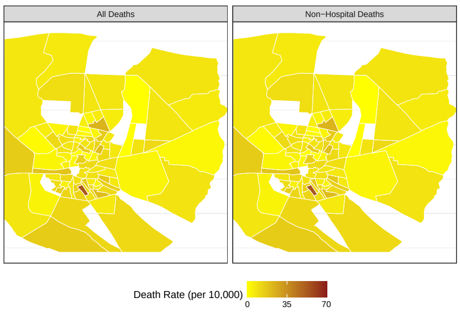
Week 50 1920



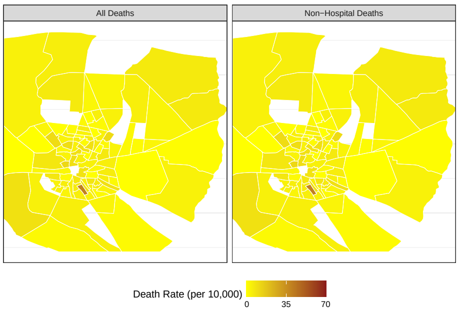
Week 51 1920



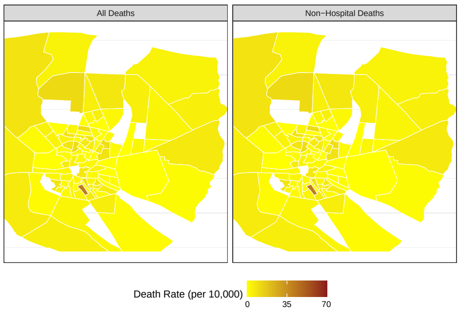
Week 52 1920



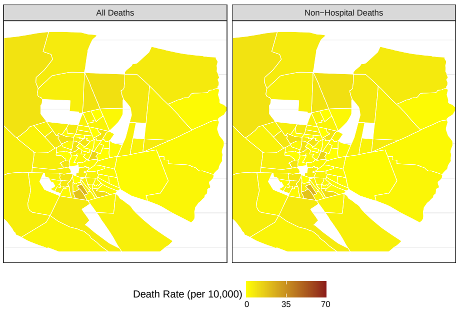
Week 1 1921



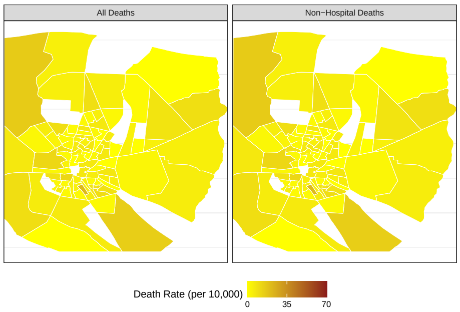
Week 2 1921



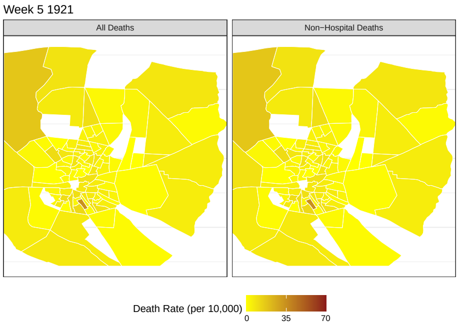
Week 3 1921



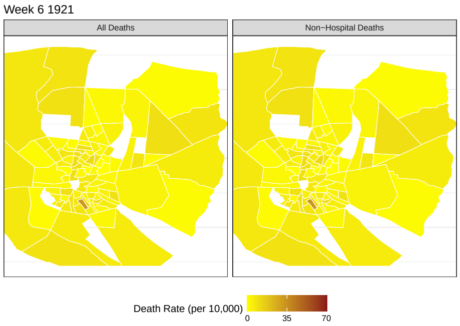
Week 4 1921



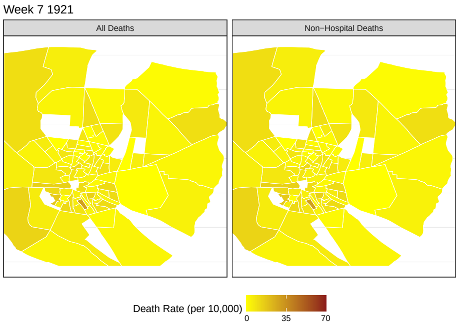
Week 5 1921



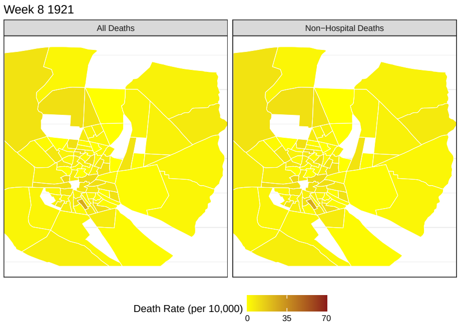
Week 6 1921



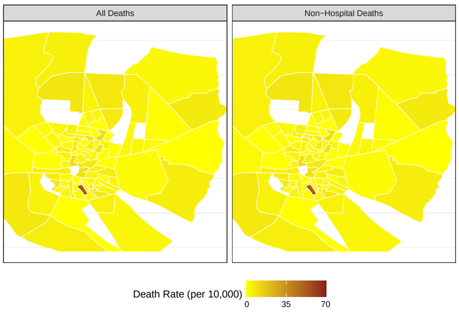
Week 7 1921



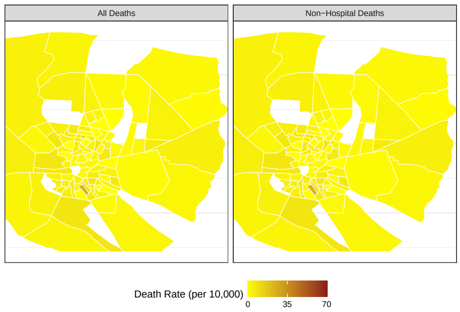
Week 8 1921



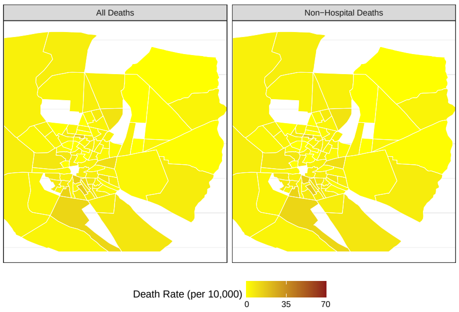
Week 9 1921



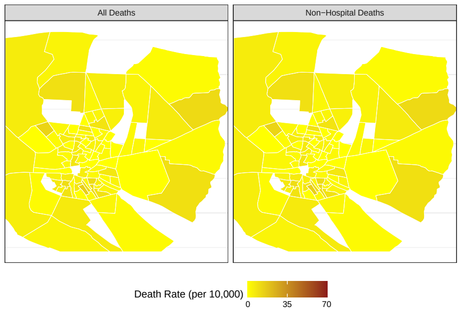
Week 10 1921



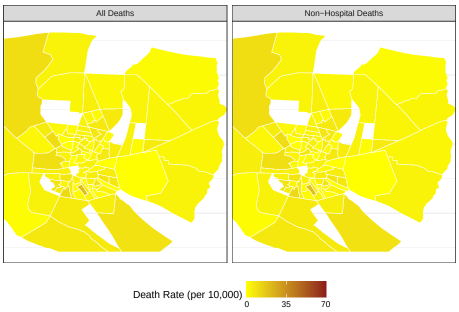
Week 11 1921



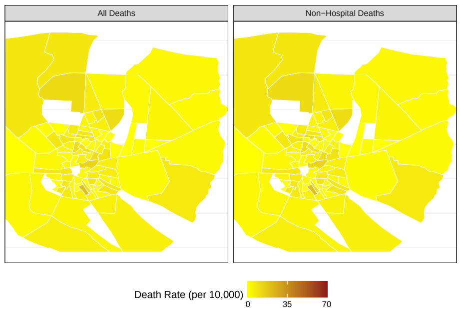
Week 12 1921



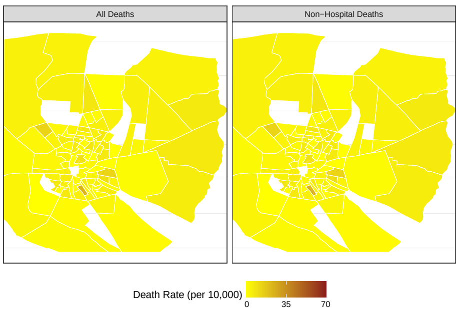
Week 13 1921



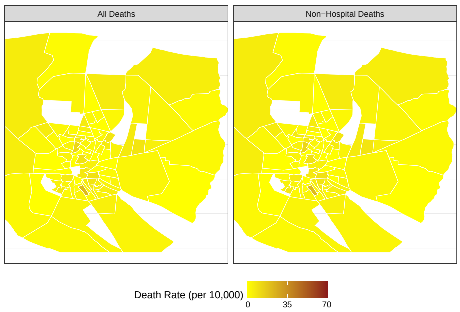
Week 14 1921



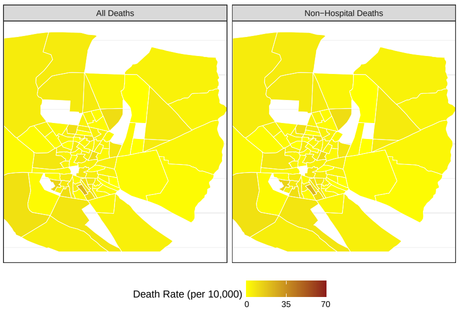
Week 15 1921



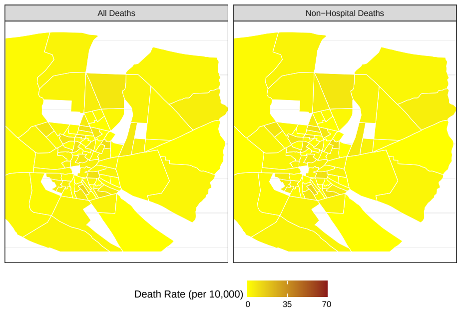
Week 16 1921



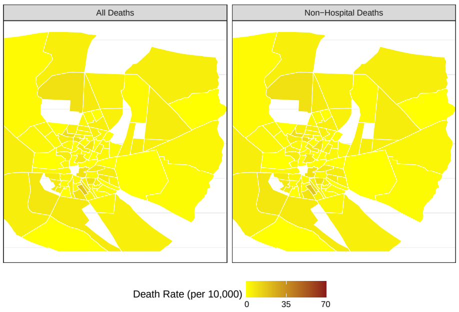
Week 17 1921



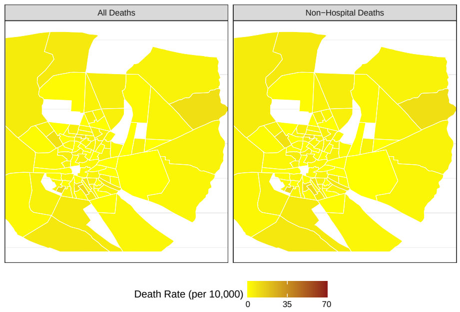
Week 18 1921



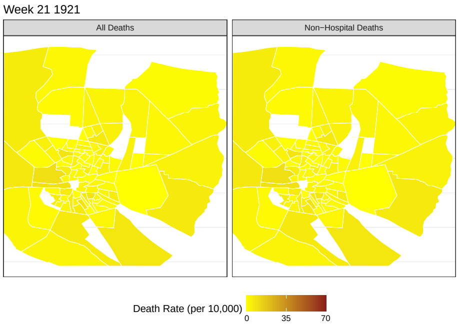
Week 19 1921



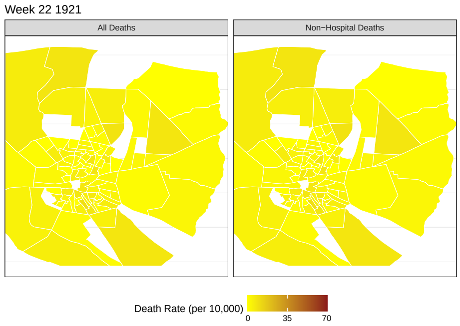
Week 20 1921



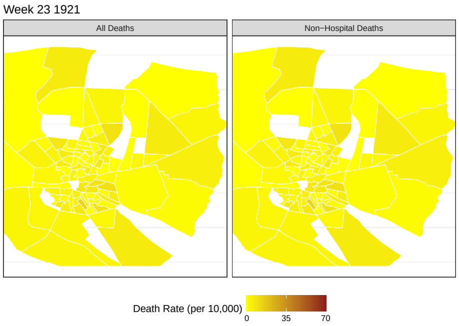
Week 21 1921



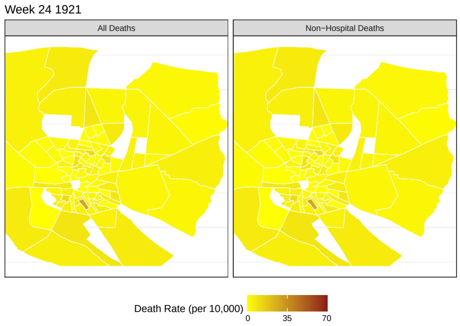
Week 22 1921



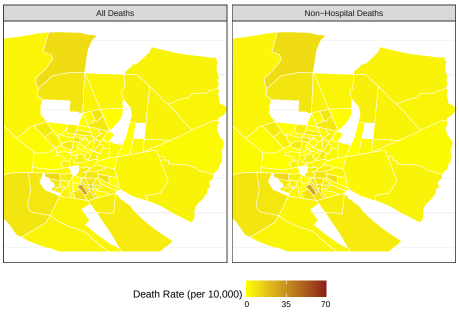
Week 23 1921



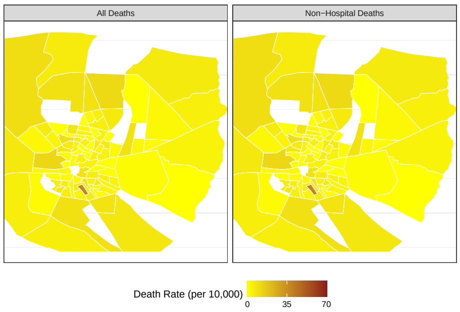
Week 24 1921



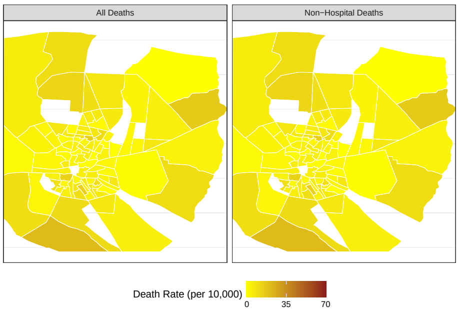
Week 25 1921



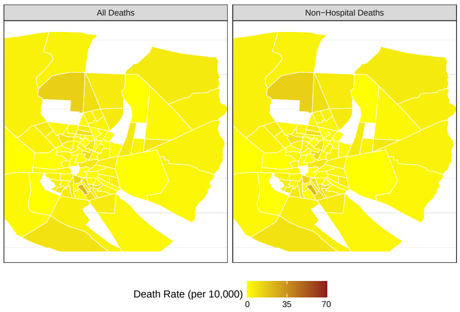
Week 26 1921



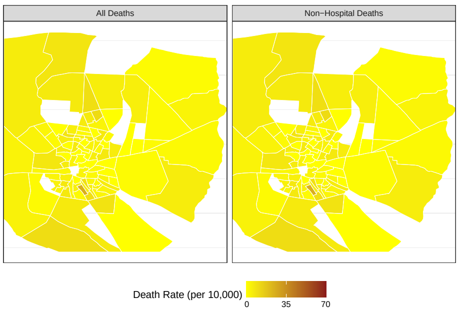
Week 27 1921



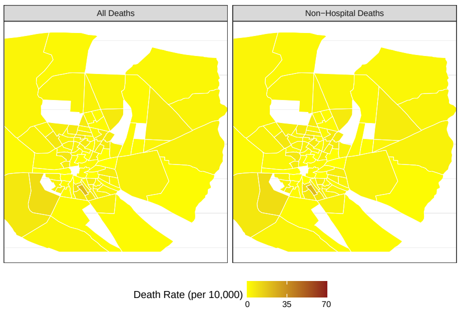
Week 28 1921



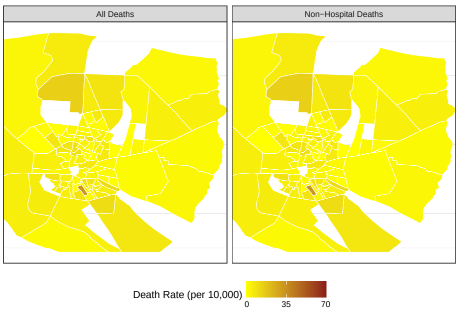
Week 29 1921



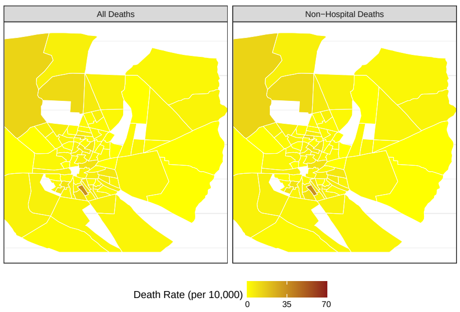
Week 30 1921



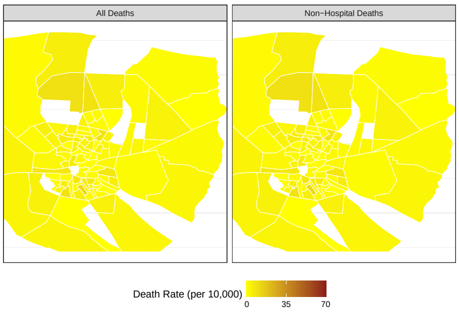
Week 31 1921



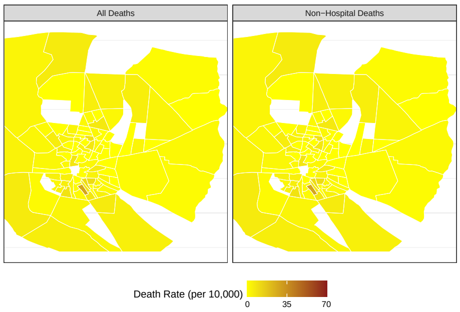
Week 32 1921



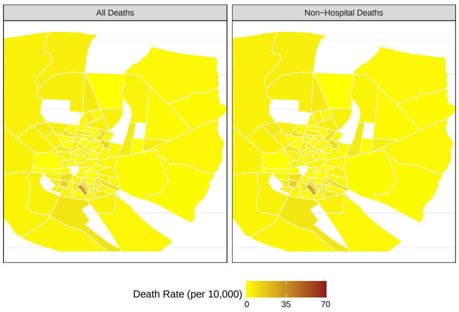
Week 33 1921



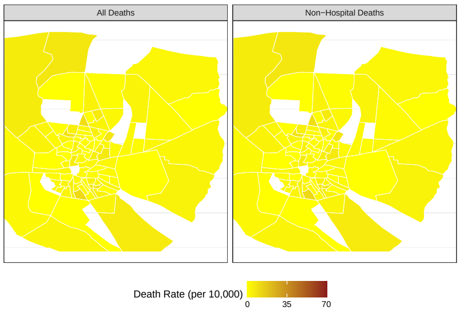
Week 34 1921



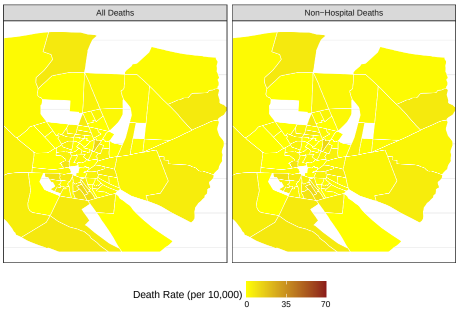
Week 35 1921



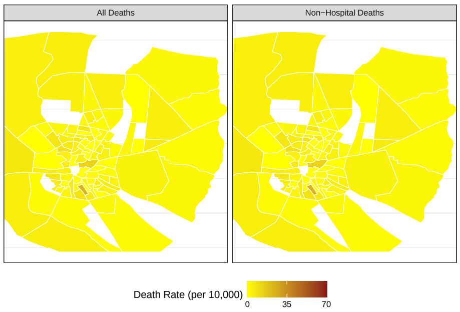
Week 36 1921



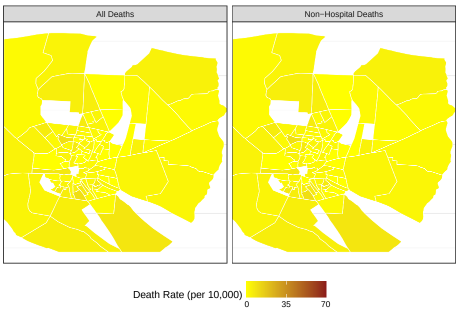
Week 37 1921



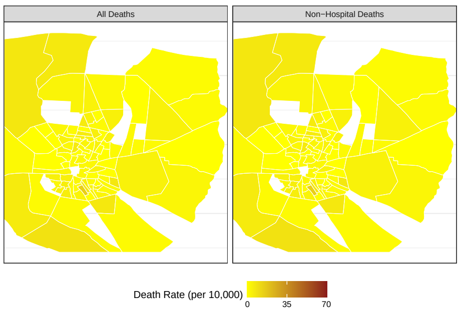
Week 38 1921

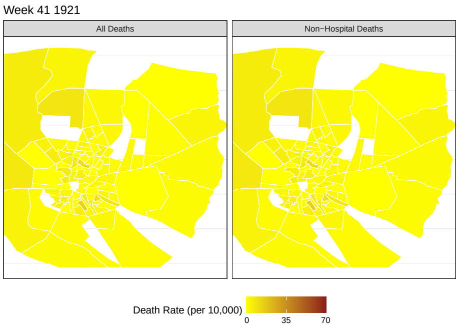


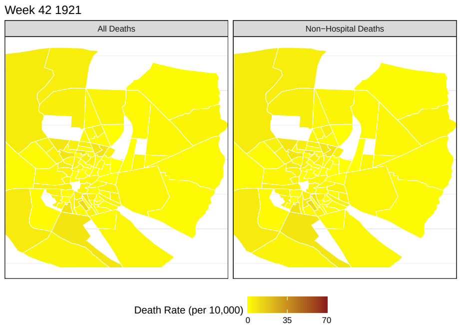
Week 39 1921

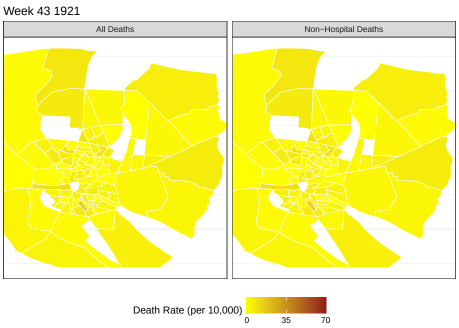


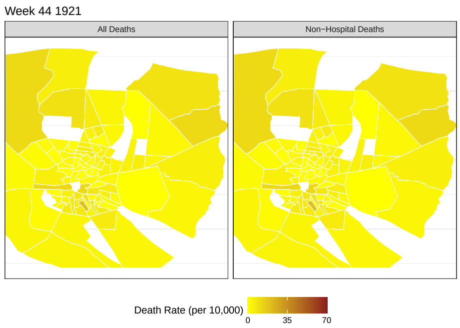
Week 40 1921

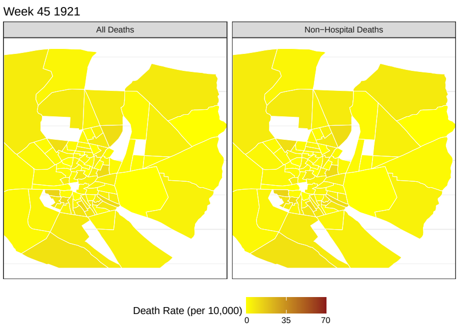


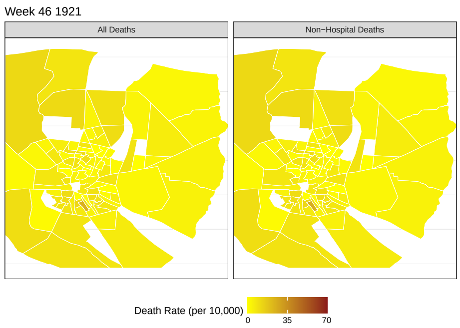

Week 41 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

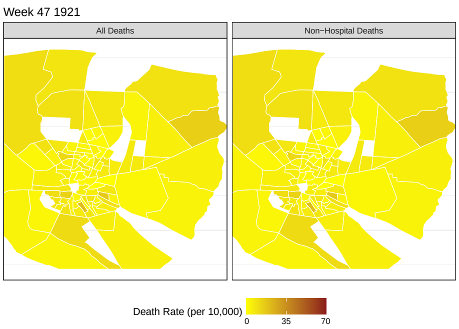

Week 42 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

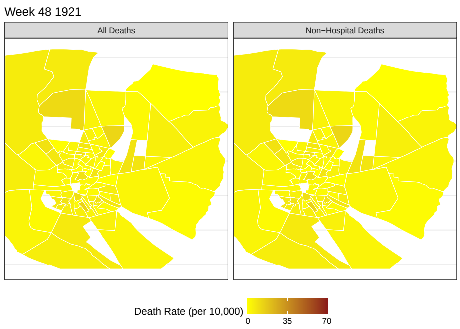

Week 43 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70


Week 44 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

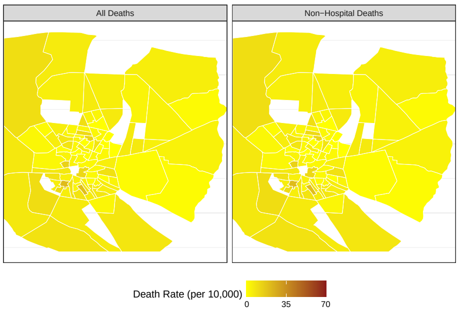

Week 45 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70


Week 46 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

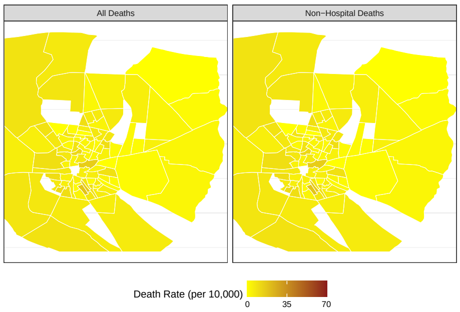

Week 47 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70


Week 48 1921
All Deaths
Non−Hospital Deaths
Death Rate (per 10,000)
0
35
70

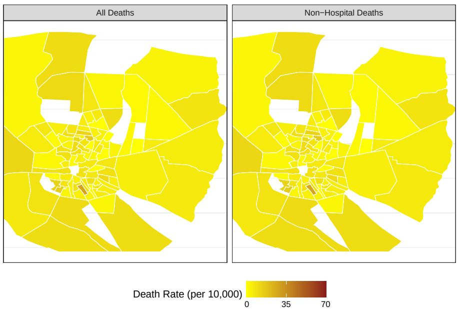
Week 49 1921



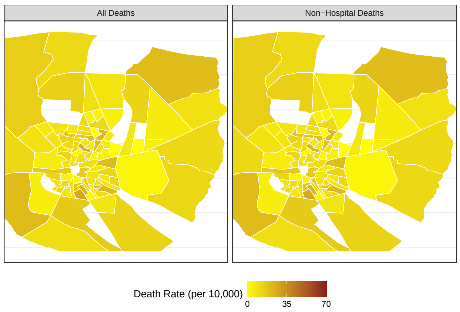
Week 50 1921



Week 51 1921



Week 52 1921



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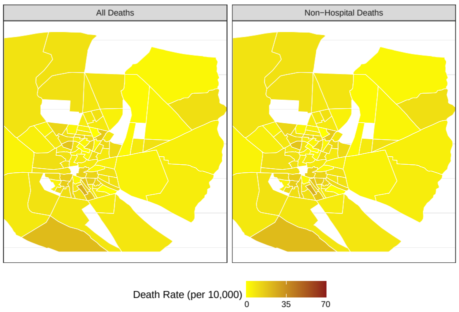

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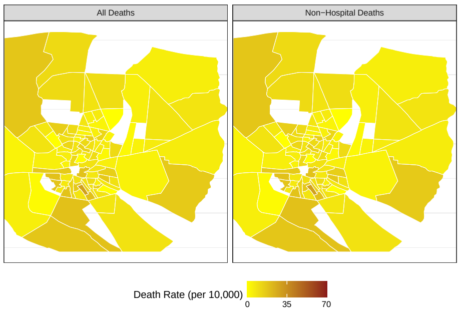

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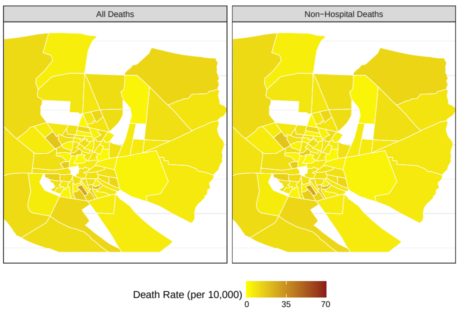

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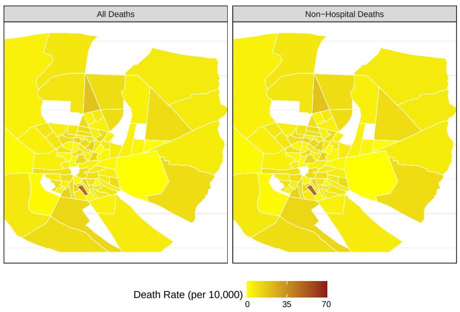

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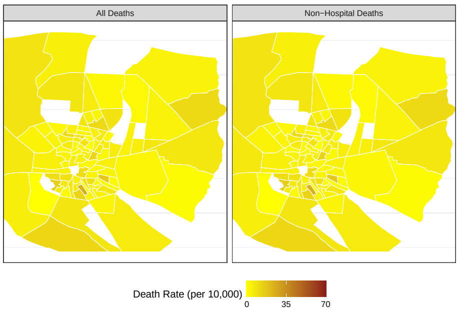

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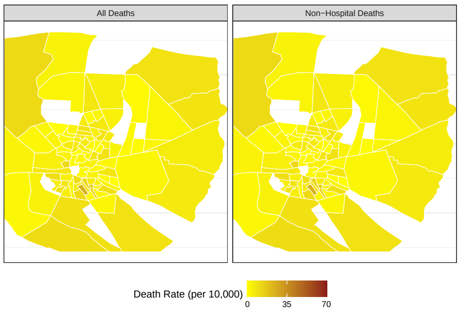

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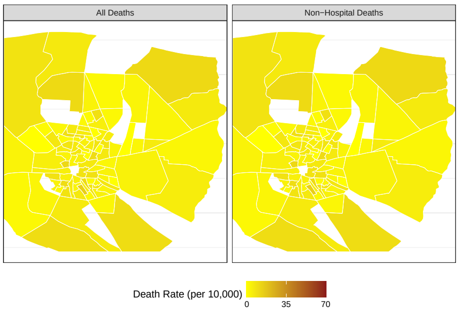

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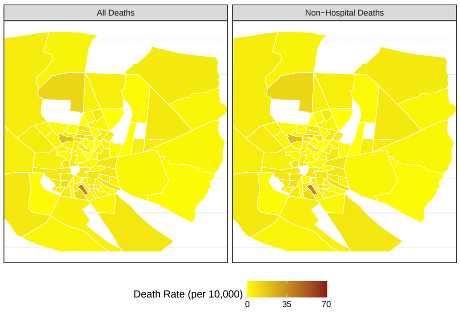

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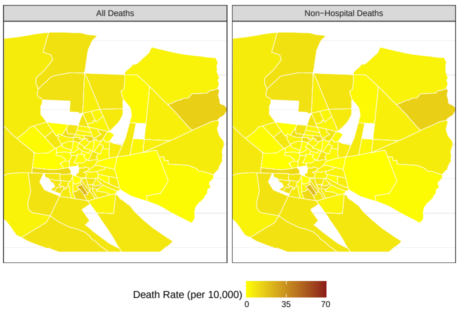

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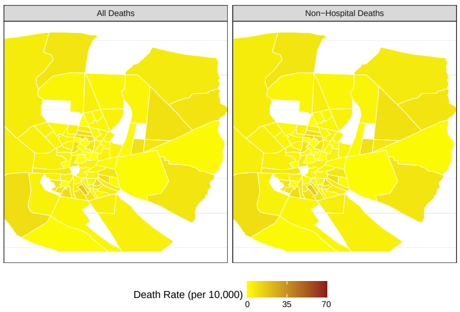

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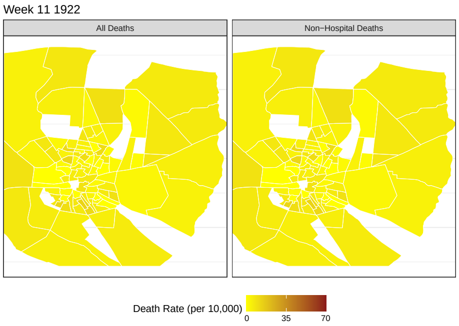

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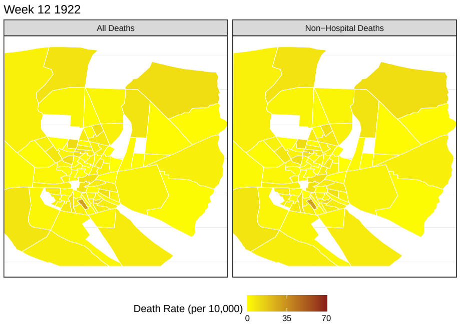

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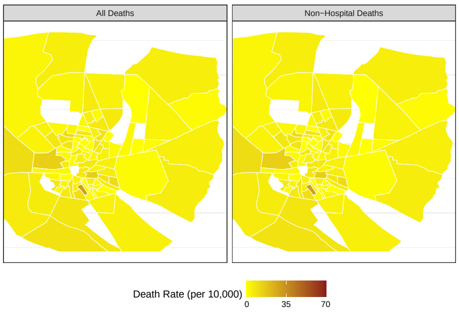

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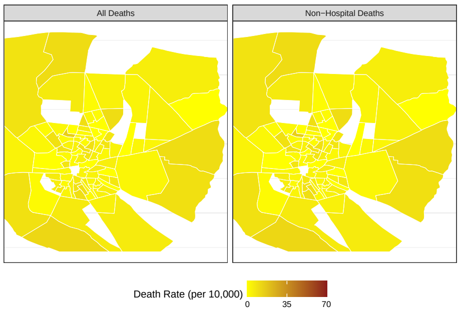

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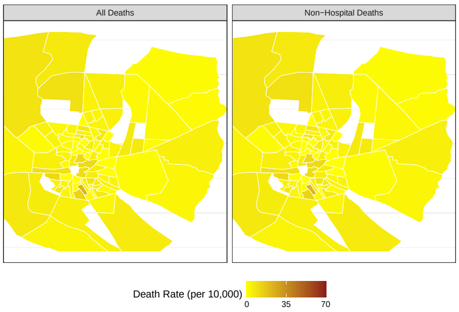

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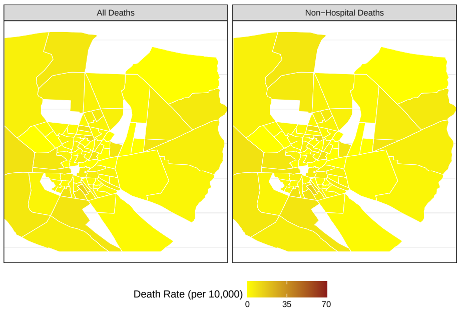

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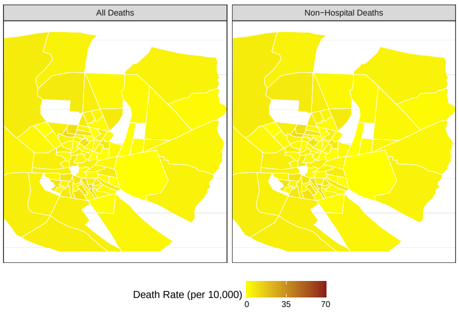

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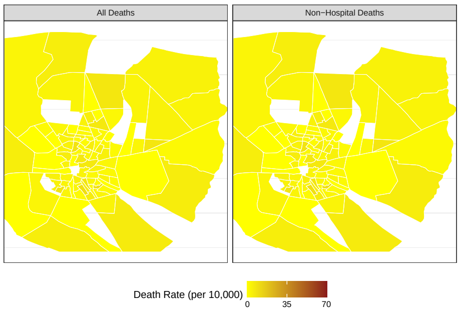

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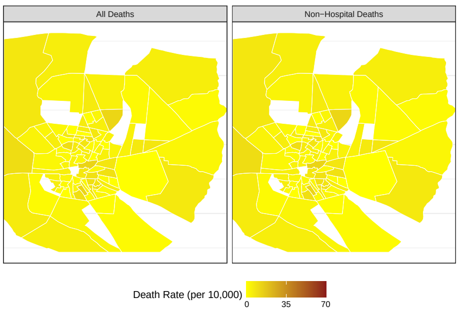

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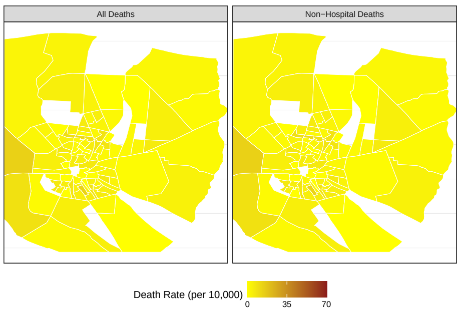

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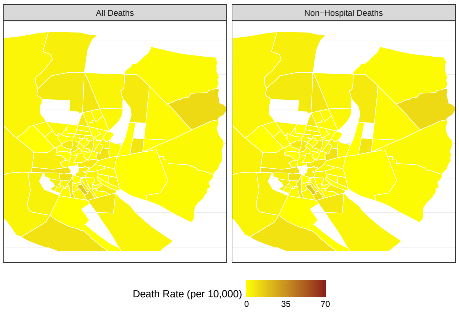

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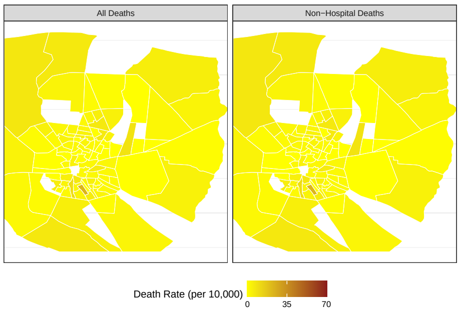

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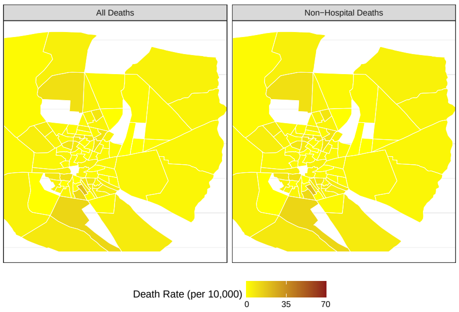

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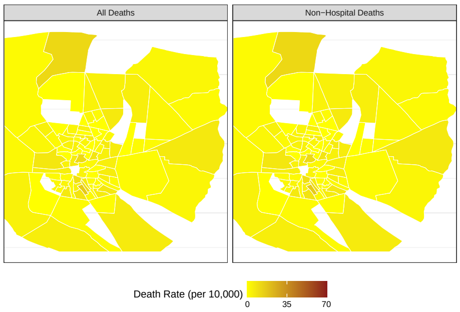

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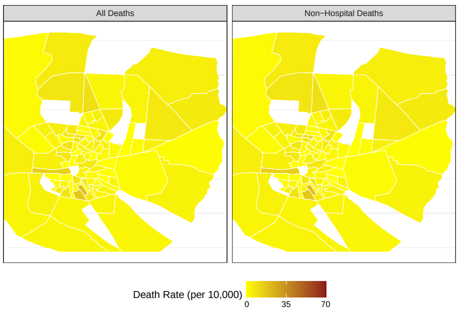

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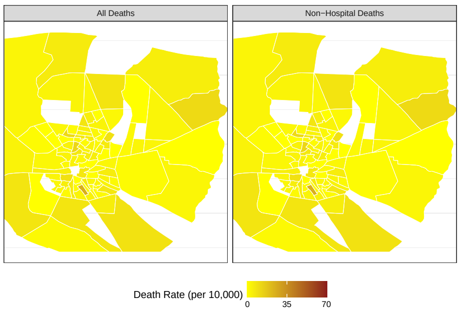

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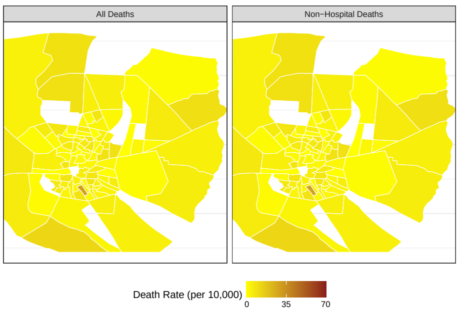

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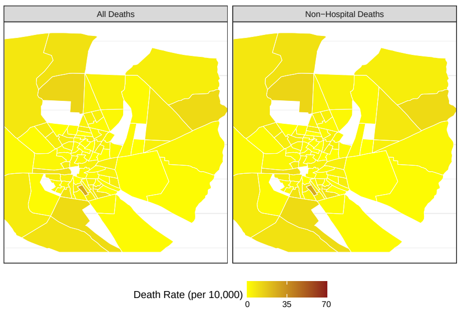

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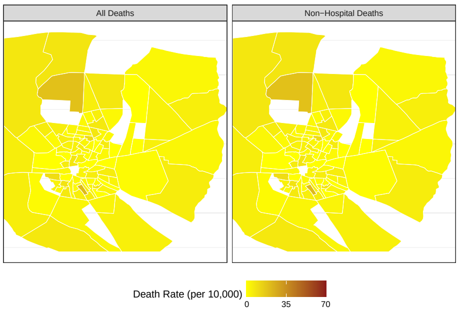

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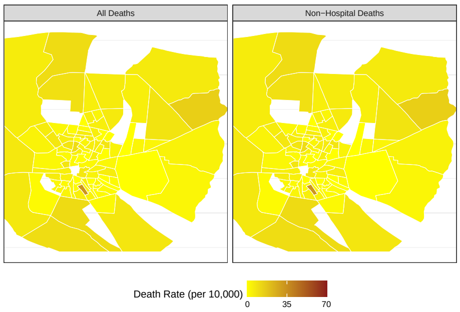

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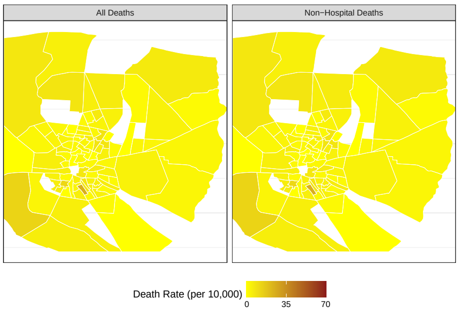

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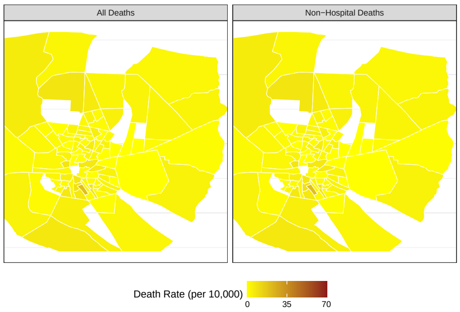

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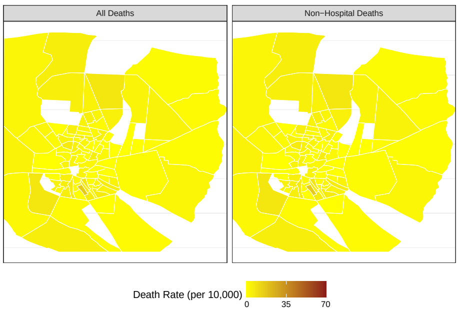

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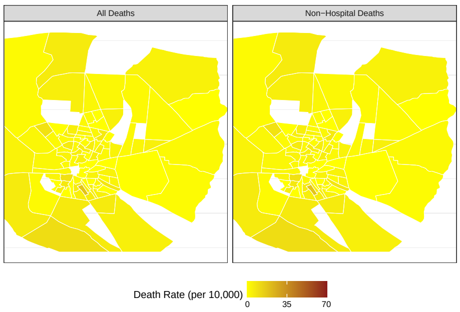

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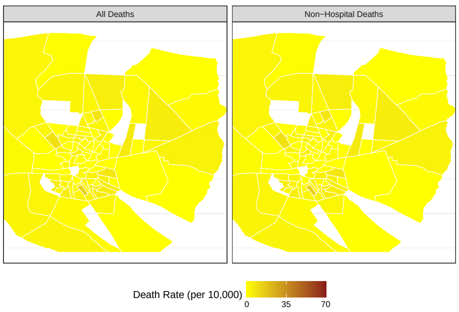

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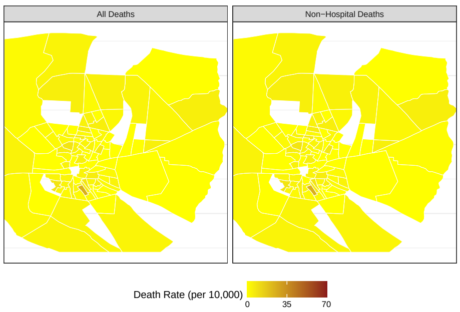

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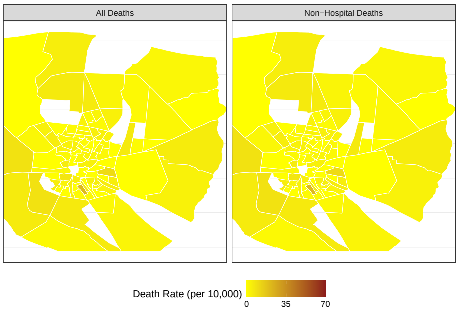

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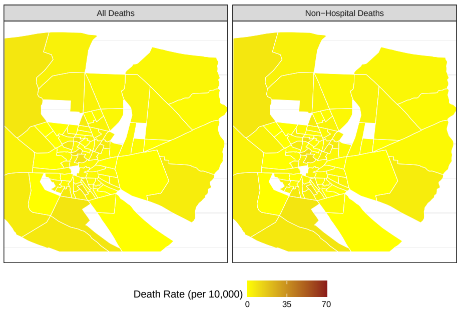

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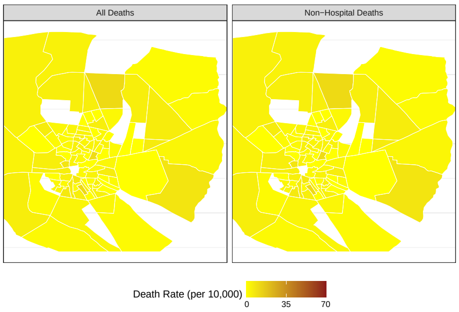

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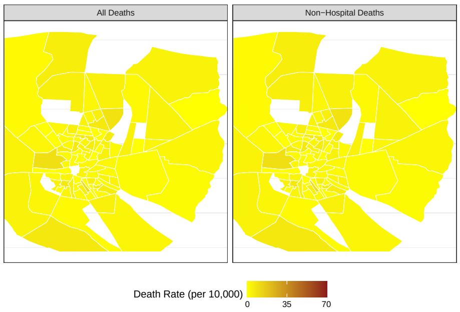

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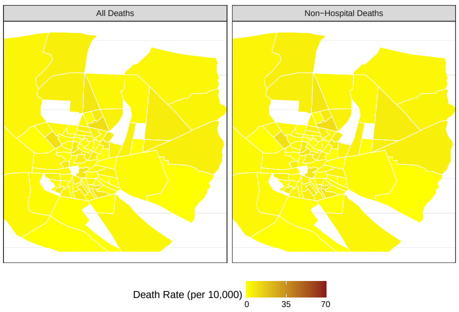

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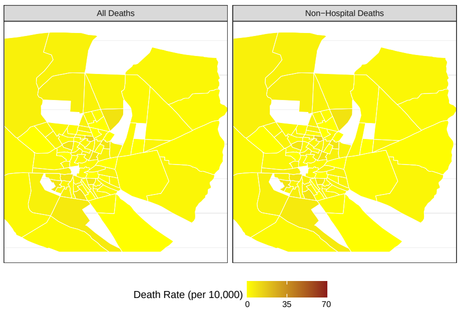

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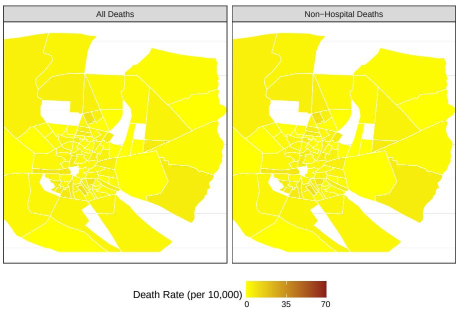

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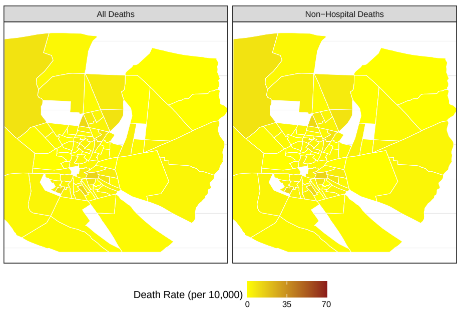

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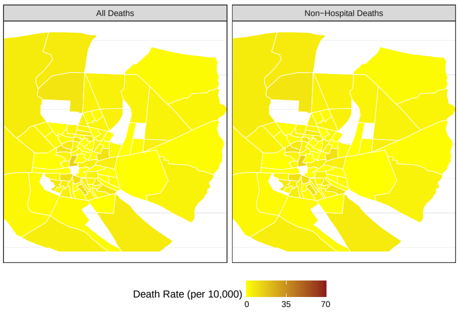

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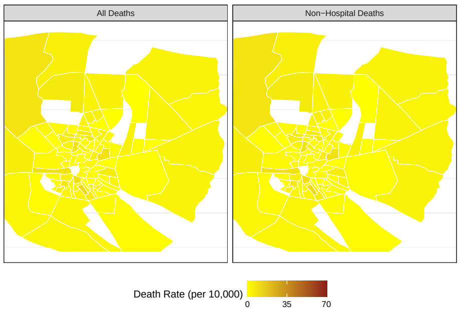

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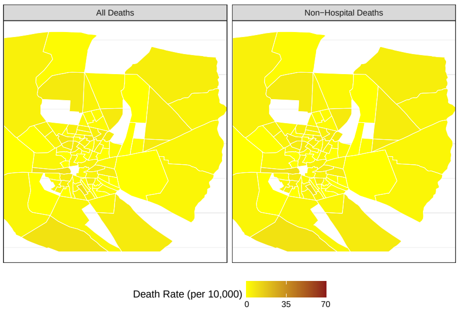

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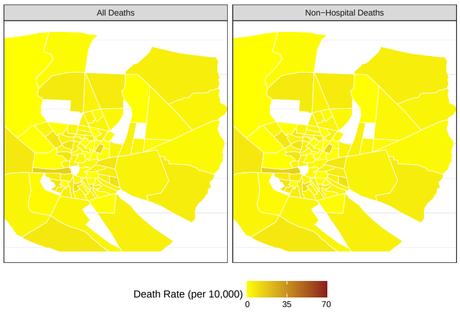

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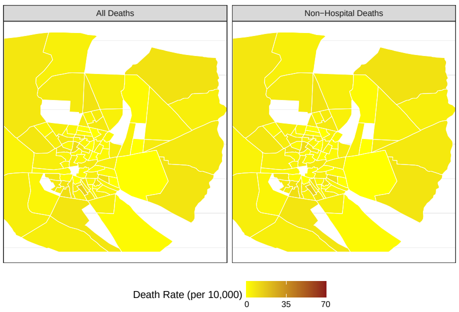

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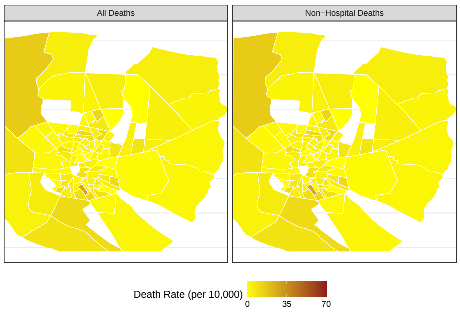

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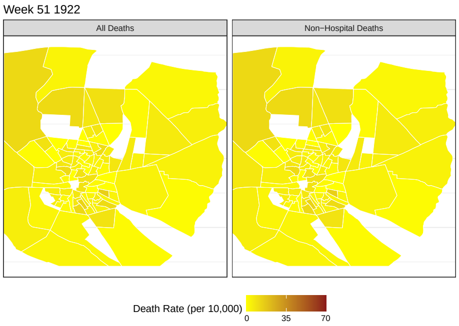

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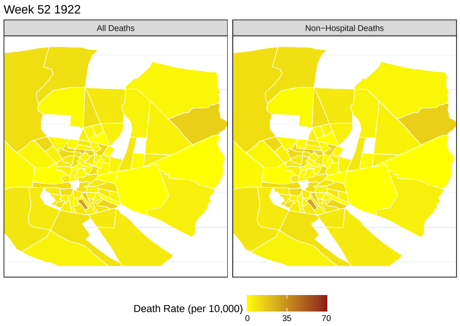

Appendix E

Additional Material: Chapter 6

E.1 Age-Specific Excess Mortality by Sex and Wave

E.1.1 Female Excess

Table E.1 Scottish Female Age-Specific Excess Mortality, 1918-1921

Age Group	Wave	Excess Mortality Rate	Excess Deaths	Standardized Mortality Ratio
[0,5)	Total	145.04	3322.32	1.66
[5,10)	Total	22.90	563.62	2.33
[10,20)	Total	22.15	1075.22	2.15
[20,25)	Total	47.89	1059.42	2.63
[25,30)	Total	74.64	1501.16	3.37
[30,40)	Total	52.63	1908.08	2.31
[40,50)	Total	32.97	1001.32	1.63
[50,60)	Total	48.58	1080.38	1.52
[60,70)	Total	87.19	1286.79	1.46
70+	Total	161.53	1614.59	1.36
[0,5)	Spring	1.84	42.66	1.12
[5,10)	Spring	0.57	14.04	1.22
[10,20)	Spring	1.77	85.99	1.51
[20,25)	Spring	4.35	95.86	2.21
[25,30)	Spring	4.53	90.89	1.97
[30,40)	Spring	2.81	102.15	1.53
[40,50)	Spring	1.20	36.27	1.16
[50,60)	Spring	1.80	39.53	1.23
[60,70)	Spring	0.88	12.68	1.08
70+	Spring	2.41	23.57	1.08
[0,5)	Fall	47.88	1112.44	1.84
[5,10)	Fall	16.95	417.53	3.05
[10,20)	Fall	14.90	723.34	2.95
[20,25)	Fall	26.83	590.79	3.68
[25,30)	Fall	44.32	888.29	5.08
[30,40)	Fall	30.36	1102.05	3.01
[40,50)	Fall	17.31	521.28	1.85
[50,60)	Fall	18.02	394.56	1.56
[60,70)	Fall	23.01	332.06	1.36
70	Fall	14.10	138.14	1.23
[0,5)	Winter	46.16	1013.18	1.55
[10,20)	Winter	5.18	251.73	1.75
[20,25)	Winter	13.35	296.81	2.28
[25,30)	Winter	20.18	407.73	3.04
[30,40)	Winter	13.43	489.07	1.94
[40,50)	Winter	9.95	303.87	1.66
[5,10)	Winter	5.19	127.57	1.94
[50,60)	Winter	19.44	432.45	1.56
[60,70)	Winter	34.21	500.15	1.51
70+	Winter	80.50	792.57	1.41
[0,5)	Echo	49.16	1154.04	1.78
[5,10)	Echo	0.19	4.47	1.23
[10,20)	Echo	0.29	14.17	1.23
[20,25)	Echo	3.37	75.97	1.63
[25,30)	Echo	5.61	114.25	1.94
[30,40)	Echo	6.02	214.82	2.12
[40,50)	Echo	4.51	139.89	1.49
[50,60)	Echo	9.32	213.85	1.52
[60,70)	Echo	29.09	441.89	1.61
70+	Echo	64.53	660.32	1.41

E.1.2 Male Excess

Table E.2 Scottish Male Age-Specific Excess Mortality, 1918-1921

Age Group	Wave	Excess Mortality Rate	Excess Deaths	Standardized Mortality Ratio
[0,5)	Total	156.15	3641.76	1.58
[5,10)	Total	19.26	481.06	1.85
[10,20)	Total	20.95	998.77	2.32
[20,25)	Total	42.51	825.48	2.37
[25,30)	Total	79.50	1354.16	3.15
[30,40)	Total	59.14	1839.28	2.39
[40,50)	Total	32.85	938.03	1.68
[50,60)	Total	32.19	664.32	1.38
[60,70)	Total	73.86	937.81	1.40
70+	Total	121.49	785.54	1.31
[0,5)	Spring	0.69	16.25	1.06
[5,10)	Spring	1.21	30.39	1.25
[10,20)	Spring	2.13	101.37	1.71
[20,25)	Spring	3.67	71.00	1.53
[25,30)	Spring	4.92	83.76	1.70
[30,40)	Spring	2.71	84.73	1.64
[40,50)	Spring	2.47	70.37	1.47
[50,60)	Spring	1.93	39.05	1.19
[60,70)	Spring	3.75	46.36	1.13
70+	Spring	1.35	8.47	1.07
[0,5)	Fall	47.40	1118.58	1.61
[5,10)	Fall	12.08	302.73	2.63
[10,20)	Fall	14.54	691.67	2.97
[20,25)	Fall	25.22	487.25	3.35
[25,30)	Fall	45.36	771.75	4.54
[30,40)	Fall	32.77	1023.68	3.22
[40,50)	Fall	17.43	496.53	1.78
[50,60)	Fall	12.30	249.13	1.39
[60,70)	Fall	17.16	212.11	1.31
70+	Fall	16.81	105.02	1.20
[0,5)	Winter	53.00	1188.65	1.48
[5,10)	Winter	5.28	131.53	1.65
[10,20)	Winter	4.01	192.82	1.82
[20,25)	Winter	12.99	254.56	2.16
[25,30)	Winter	27.07	461.53	2.98
[30,40)	Winter	17.86	554.21	2.18
[40,50)	Winter	9.70	277.53	1.71
[50,60)	Winter	12.08	248.87	1.43
[60,70)	Winter	32.55	408.91	1.46
70+	Winter	40.50	255.07	1.27
[0,5)	Echo	55.05	1318.29	1.81
[5,10)	Echo	0.68	16.41	1.30
[10,20)	Echo	0.27	12.91	1.44
[20,25)	Echo	0.62	12.67	1.30
[25,30)	Echo	2.15	37.12	1.62
[30,40)	Echo	5.79	176.66	1.69
[40,50)	Echo	3.26	93.60	1.47
[50,60)	Echo	5.89	127.26	1.41
[60,70)	Echo	20.40	270.44	1.68
70+	Echo	62.83	416.98	1.43

E.2 Seasonal Life Tables by Sex, and Pre- or During Epidemic Period

Table E.3 Pre-epidemic Female Lifetable: Herald Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.09	0.31	0.08	10000.00	815.40	9437.37	583462.52	58.35
1.00	0.02	0.50	0.02	9184.60	194.29	9087.46	574025.14	62.50
2.00	0.01	0.50	0.01	8990.31	112.40	8934.11	564937.68	62.84
3.00	0.01	0.50	0.01	8877.91	73.10	8841.36	556003.57	62.63
4.00	0.01	0.50	0.01	8804.81	48.92	8780.35	547162.21	62.14
5.00	0.00	0.50	0.00	8755.90	35.06	8738.37	538381.86	61.49
6.00	0.00	0.50	0.00	8720.84	26.25	8707.71	529643.49	60.73
7.00	0.00	0.50	0.00	8694.58	29.46	8679.85	520935.78	59.91
8.00	0.00	0.50	0.00	8665.12	21.18	8654.54	512255.93	59.12
9.00	0.00	0.50	0.00	8643.95	18.99	8634.45	503601.39	58.26
10.00	0.00	0.50	0.00	8624.96	15.93	8616.99	494966.94	57.39
11.00	0.00	0.50	0.00	8609.03	19.98	8599.04	486349.95	56.49
12.00	0.00	0.50	0.00	8589.05	17.58	8580.26	477750.91	55.62
13.00	0.00	0.50	0.00	8571.47	20.12	8561.41	469170.65	54.74
14.00	0.00	0.50	0.00	8551.35	25.59	8538.56	460609.24	53.86
15.00	0.00	0.50	0.00	8525.76	24.24	8513.64	452070.68	53.02
16.00	0.00	0.50	0.00	8501.52	25.84	8488.60	443557.04	52.17
17.00	0.00	0.50	0.00	8475.68	28.25	8461.56	435068.44	51.33
18.00	0.00	0.50	0.00	8447.43	30.88	8431.99	426606.88	50.50
19.00	0.00	0.50	0.00	8416.55	31.34	8400.88	418174.89	49.68
20.00	0.00	0.50	0.00	8385.22	25.26	8372.59	409774.00	48.87
21.00	0.00	0.50	0.00	8359.96	28.08	8345.92	401401.42	48.01
22.00	0.00	0.50	0.00	8331.88	32.78	8315.49	393055.50	47.17
23.00	0.00	0.50	0.00	8299.10	27.80	8285.20	384740.01	46.36
24.00	0.00	0.50	0.00	8271.30	34.35	8254.13	376454.80	45.51
25.00	0.00	0.50	0.00	8236.96	31.36	8221.28	368200.67	44.70
26.00	0.00	0.50	0.00	8205.60	24.81	8193.20	359979.39	43.87
27.00	0.00	0.50	0.00	8180.79	37.54	8162.03	351786.19	43.00
28.00	0.00	0.50	0.00	8143.26	26.50	8130.01	343624.17	42.20
29.00	0.00	0.50	0.00	8116.76	33.13	8100.20	335494.16	41.33
30.00	0.00	0.50	0.00	8083.63	40.24	8063.51	327393.96	40.50
31.00	0.00	0.50	0.00	8043.39	34.11	8026.33	319330.45	39.70
32.00	0.01	0.50	0.01	8009.27	42.23	7988.16	311304.12	38.87
33.00	0.00	0.50	0.00	7967.05	34.57	7949.76	303315.96	38.07
34.00	0.00	0.50	0.00	7932.48	37.91	7913.52	295366.20	37.24
35.00	0.00	0.50	0.00	7894.56	36.45	7876.34	287452.68	36.41
36.00	0.01	0.50	0.01	7858.11	40.92	7837.65	279576.34	35.58
37.00	0.01	0.50	0.01	7817.19	44.65	7794.87	271738.69	34.76
38.00	0.01	0.50	0.01	7772.54	43.94	7750.57	263943.83	33.96
39.00	0.01	0.50	0.01	7728.60	47.20	7705.00	256193.26	33.15
40.00	0.01	0.50	0.01	7681.40	47.00	7657.90	248488.25	32.35
41.00	0.01	0.50	0.01	7634.40	51.61	7608.59	240830.35	31.55
42.00	0.01	0.50	0.01	7582.79	51.18	7557.20	233221.76	30.76
43.00	0.01	0.50	0.01	7531.61	55.37	7503.93	225664.56	29.96
44.00	0.01	0.50	0.01	7476.24	51.59	7450.45	218160.64	29.18
45.00	0.01	0.50	0.01	7424.65	61.50	7393.91	210710.19	28.38
46.00	0.01	0.50	0.01	7363.16	61.39	7332.46	203316.28	27.61
47.00	0.01	0.50	0.01	7301.77	55.46	7274.04	195983.82	26.84
48.00	0.01	0.50	0.01	7246.31	74.49	7209.06	188709.78	26.04
49.00	0.01	0.50	0.01	7171.81	68.76	7137.43	181500.72	25.31
50.00	0.01	0.50	0.01	7103.05	68.11	7069.00	174363.29	24.55
51.00	0.01	0.50	0.01	7034.94	73.33	6998.28	167294.29	23.78
52.00	0.01	0.50	0.01	6961.61	80.67	6921.27	160296.01	23.03
53.00	0.01	0.50	0.01	6880.94	72.02	6844.93	153374.74	22.29
54.00	0.01	0.50	0.01	6808.92	97.62	6760.11	146529.81	21.52
55.00	0.02	0.50	0.02	6711.30	105.33	6658.64	139769.69	20.83
56.00	0.02	0.50	0.02	6605.98	105.53	6553.21	133111.05	20.15
57.00	0.02	0.50	0.02	6500.44	102.15	6449.37	126557.85	19.47
58.00	0.02	0.50	0.02	6398.29	105.76	6345.41	120108.48	18.77
59.00	0.02	0.50	0.02	6292.53	108.81	6238.13	113763.07	18.08
60.00	0.02	0.50	0.02	6183.73	116.86	6125.30	107524.94	17.39
61.00	0.02	0.50	0.02	6066.87	126.91	6003.42	101399.64	16.71
62.00	0.02	0.50	0.02	5939.96	142.85	5868.54	95396.22	16.06
63.00	0.02	0.50	0.02	5797.11	136.28	5728.97	89527.69	15.44
64.00	0.03	0.50	0.03	5660.84	161.05	5580.31	83798.71	14.80
65.00	0.03	0.50	0.03	5499.79	173.50	5413.04	78218.40	14.22
66.00	0.03	0.50	0.03	5326.28	138.30	5257.13	72805.37	13.67
67.00	0.03	0.50	0.03	5187.98	158.83	5108.57	67548.23	13.02
68.00	0.03	0.50	0.03	5029.15	165.20	4946.55	62439.66	12.42
69.00	0.04	0.50	0.04	4863.95	171.03	4778.44	57493.11	11.82
70.00	0.04	0.50	0.04	4692.92	196.32	4594.76	52714.68	11.23
71.00	0.04	0.50	0.04	4496.60	175.53	4408.84	48119.91	10.70
72.00	0.06	0.50	0.06	4321.07	245.86	4198.14	43711.07	10.12
73.00	0.07	0.50	0.07	4075.21	278.14	3936.14	39512.93	9.70
74.00	0.06	0.50	0.06	3797.07	233.04	3680.54	35576.79	9.37
75.00	0.07	0.50	0.07	3564.02	252.51	3437.76	31896.25	8.95
76.00	0.08	0.50	0.08	3311.51	266.36	3178.33	28458.48	8.59
77.00	0.08	0.50	0.07	3045.15	220.82	2934.74	25280.16	8.30
78.00	0.10	0.50	0.09	2824.33	263.48	2692.59	22345.42	7.91
79.00	0.09	0.50	0.09	2560.85	223.65	2449.02	19652.83	7.67
80.00	0.10	0.50	0.09	2337.20	214.20	2230.10	17203.81	7.36
81.00	0.09	0.50	0.09	2123.00	184.28	2030.86	14973.71	7.05
82.00	0.12	0.50	0.12	1938.72	225.37	1826.04	12942.85	6.68
83.00	0.12	0.50	0.11	1713.35	192.70	1617.00	11116.82	6.49
84.00	0.13	0.50	0.12	1520.65	184.60	1428.35	9499.81	6.25
85.00	0.17	6.04	1.00	1336.05	1336.05	8071.47	8071.47	6.04

Table E.4 Epidemic Female Lifetable: Herald Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.08	0.31	0.08	10000.00	785.70	9457.87	572260.43	57.23
1.00	0.02	0.50	0.02	9214.30	194.54	9117.03	562802.57	61.08
2.00	0.01	0.50	0.01	9019.76	104.72	8967.40	553685.54	61.39
3.00	0.01	0.50	0.01	8915.04	75.83	8877.12	544718.14	61.10
4.00	0.01	0.50	0.01	8839.21	59.67	8809.38	535841.02	60.62
5.00	0.00	0.50	0.00	8779.54	35.00	8762.04	527031.64	60.03
6.00	0.00	0.50	0.00	8744.54	32.74	8728.17	518269.60	59.27
7.00	0.00	0.50	0.00	8711.80	25.53	8699.03	509541.43	58.49
8.00	0.00	0.50	0.00	8686.27	24.65	8673.94	500842.40	57.66
9.00	0.00	0.50	0.00	8661.62	24.14	8649.55	492168.46	56.82
10.00	0.00	0.50	0.00	8637.48	20.37	8627.29	483518.91	55.98
11.00	0.00	0.50	0.00	8617.11	20.51	8606.85	474891.62	55.11
12.00	0.00	0.50	0.00	8596.60	19.98	8586.61	466284.77	54.24
13.00	0.00	0.50	0.00	8576.61	28.72	8562.26	457698.17	53.37
14.00	0.00	0.50	0.00	8547.90	32.45	8531.67	449135.91	52.54
15.00	0.00	0.50	0.00	8515.45	37.23	8496.83	440604.24	51.74
16.00	0.01	0.50	0.01	8478.22	45.09	8455.68	432107.40	50.97
17.00	0.00	0.50	0.00	8433.13	41.10	8412.58	423651.73	50.24
18.00	0.00	0.50	0.00	8392.03	38.79	8372.63	415239.15	49.48
19.00	0.00	0.50	0.00	8353.24	41.25	8332.61	406866.51	48.71
20.00	0.01	0.50	0.01	8311.98	47.50	8288.23	398533.90	47.95
21.00	0.01	0.50	0.01	8264.48	46.83	8241.07	390245.67	47.22
22.00	0.00	0.50	0.00	8217.65	37.13	8199.08	382004.60	46.49
23.00	0.01	0.50	0.01	8180.52	43.19	8158.92	373805.52	45.69
24.00	0.01	0.50	0.01	8137.32	45.39	8114.63	365646.60	44.93
25.00	0.01	0.50	0.01	8091.94	53.18	8065.35	357531.97	44.18
26.00	0.01	0.50	0.01	8038.75	45.89	8015.81	349466.63	43.47
27.00	0.01	0.50	0.01	7992.86	49.54	7968.10	341450.82	42.72
28.00	0.01	0.50	0.01	7943.33	44.25	7921.20	333482.72	41.98
29.00	0.01	0.50	0.01	7899.08	42.70	7877.73	325561.52	41.22
30.00	0.01	0.50	0.01	7856.38	47.47	7832.64	317683.79	40.44
31.00	0.01	0.50	0.01	7808.91	44.97	7786.42	309851.15	39.68
32.00	0.01	0.50	0.01	7763.93	47.98	7739.94	302064.73	38.91
33.00	0.01	0.50	0.01	7715.95	40.13	7695.89	294324.78	38.14
34.00	0.01	0.50	0.01	7675.83	49.15	7651.25	286628.89	37.34
35.00	0.01	0.50	0.01	7626.68	55.90	7598.73	278977.64	36.58
36.00	0.01	0.50	0.01	7570.78	40.44	7550.56	271378.91	35.85
37.00	0.01	0.50	0.01	7530.34	45.94	7507.37	263828.36	35.04
38.00	0.01	0.50	0.01	7484.40	42.28	7463.26	256320.99	34.25
39.00	0.01	0.50	0.01	7442.12	45.23	7419.51	248857.73	33.44
40.00	0.01	0.50	0.01	7396.89	52.69	7370.55	241438.22	32.64
41.00	0.01	0.50	0.01	7344.20	39.56	7324.42	234067.67	31.87
42.00	0.01	0.50	0.01	7304.64	51.42	7278.93	226743.25	31.04
43.00	0.01	0.50	0.01	7253.22	47.18	7229.63	219464.32	30.26
44.00	0.01	0.50	0.01	7206.04	51.30	7180.39	212234.69	29.45
45.00	0.01	0.50	0.01	7154.74	65.64	7121.93	205054.30	28.66
46.00	0.01	0.50	0.01	7089.11	58.65	7059.79	197932.37	27.92
47.00	0.01	0.50	0.01	7030.46	70.76	6995.09	190872.58	27.15
48.00	0.01	0.50	0.01	6959.71	58.86	6930.28	183877.50	26.42
49.00	0.01	0.50	0.01	6900.85	49.52	6876.09	176947.22	25.64
50.00	0.01	0.50	0.01	6851.33	61.94	6820.36	170071.13	24.82
51.00	0.01	0.50	0.01	6789.39	74.83	6751.98	163250.77	24.04
52.00	0.01	0.50	0.01	6714.57	88.89	6670.12	156498.79	23.31
53.00	0.01	0.50	0.01	6625.67	70.52	6590.41	149828.67	22.61
54.00	0.02	0.50	0.02	6555.15	101.91	6504.19	143238.26	21.85
55.00	0.01	0.50	0.01	6453.24	73.45	6416.51	136734.06	21.19
56.00	0.02	0.50	0.01	6379.79	95.14	6332.22	130317.55	20.43
57.00	0.01	0.50	0.01	6284.64	92.06	6238.61	123985.34	19.73
58.00	0.02	0.50	0.02	6192.58	112.00	6136.58	117746.72	19.01
59.00	0.01	0.50	0.01	6080.58	90.21	6035.48	111610.14	18.36
60.00	0.02	0.50	0.02	5990.38	107.45	5936.65	105574.66	17.62
61.00	0.02	0.50	0.02	5882.93	94.09	5835.88	99638.01	16.94
62.00	0.03	0.50	0.03	5788.84	151.84	5712.92	93802.13	16.20
63.00	0.03	0.50	0.03	5637.00	164.10	5554.95	88089.21	15.63
64.00	0.03	0.50	0.03	5472.90	145.30	5400.25	82534.26	15.08
65.00	0.03	0.50	0.03	5327.60	156.68	5249.26	77134.01	14.48
66.00	0.03	0.50	0.03	5170.92	137.96	5101.94	71884.75	13.90
67.00	0.03	0.50	0.03	5032.96	165.76	4950.09	66782.81	13.27
68.00	0.04	0.50	0.04	4867.21	177.91	4778.25	61832.72	12.70
69.00	0.04	0.50	0.03	4689.29	162.93	4607.83	57054.47	12.17
70.00	0.05	0.50	0.04	4526.36	201.18	4425.77	52446.64	11.59
71.00	0.04	0.50	0.04	4325.18	174.87	4237.74	48020.87	11.10
72.00	0.04	0.50	0.04	4150.31	178.65	4060.98	43783.12	10.55
73.00	0.06	0.50	0.06	3971.66	229.40	3856.95	39722.14	10.00
74.00	0.05	0.50	0.05	3742.25	199.02	3642.74	35865.19	9.58
75.00	0.08	0.50	0.08	3543.23	274.23	3406.12	32222.44	9.09
76.00	0.09	0.50	0.08	3269.01	271.78	3133.12	28816.32	8.82
77.00	0.08	0.50	0.07	2997.23	221.78	2886.34	25683.20	8.57
78.00	0.08	0.50	0.08	2775.45	218.05	2666.43	22796.86	8.21
79.00	0.08	0.50	0.07	2557.40	186.77	2464.02	20130.43	7.87
80.00	0.10	0.50	0.10	2370.63	229.14	2256.07	17666.41	7.45
81.00	0.09	0.50	0.08	2141.50	175.45	2053.77	15410.34	7.20
82.00	0.11	0.50	0.10	1966.05	201.51	1865.30	13356.57	6.79
83.00	0.11	0.50	0.11	1764.54	185.37	1671.86	11491.27	6.51
84.00	0.14	0.50	0.13	1579.17	205.84	1476.25	9819.41	6.22
85.00	0.16	6.08	1.00	1373.33	1373.33	8343.16	8343.16	6.08

Table E.5 Pre-epidemic Male Lifetable: Herald Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.11	0.30	0.10	10000.00	1031.20	9278.16	541492.63	54.15
1.00	0.02	0.50	0.02	8968.80	214.19	8861.70	532214.47	59.34
2.00	0.01	0.50	0.01	8754.61	127.75	8690.73	523352.77	59.78
3.00	0.01	0.50	0.01	8626.86	72.63	8590.54	514662.03	59.66
4.00	0.01	0.50	0.01	8554.22	48.25	8530.10	506071.49	59.16
5.00	0.00	0.50	0.00	8505.98	37.02	8487.47	497541.39	58.49
6.00	0.00	0.50	0.00	8468.95	27.70	8455.11	489053.93	57.75
7.00	0.00	0.50	0.00	8441.26	30.90	8425.81	480598.82	56.93
8.00	0.00	0.50	0.00	8410.36	21.79	8399.46	472173.02	56.14
9.00	0.00	0.50	0.00	8388.57	24.45	8376.35	463773.55	55.29
10.00	0.00	0.50	0.00	8364.12	19.52	8354.36	455397.21	54.45
11.00	0.00	0.50	0.00	8344.60	20.03	8334.59	447042.84	53.57
12.00	0.00	0.50	0.00	8324.58	16.86	8316.15	438708.25	52.70
13.00	0.00	0.50	0.00	8307.72	22.29	8296.57	430392.11	51.81
14.00	0.00	0.50	0.00	8285.43	19.29	8275.78	422095.53	50.94
15.00	0.00	0.50	0.00	8266.14	23.36	8254.46	413819.75	50.06
16.00	0.00	0.50	0.00	8242.78	24.74	8230.40	405565.30	49.20
17.00	0.00	0.50	0.00	8218.03	34.21	8200.93	397334.89	48.35
18.00	0.00	0.50	0.00	8183.82	34.37	8166.63	389133.97	47.55
19.00	0.00	0.50	0.00	8149.45	29.06	8134.92	380967.33	46.75
20.00	0.00	0.50	0.00	8120.39	31.31	8104.73	372832.41	45.91
21.00	0.00	0.50	0.00	8089.08	28.67	8074.74	364727.68	45.09
22.00	0.00	0.50	0.00	8060.41	33.64	8043.59	356652.93	44.25
23.00	0.00	0.50	0.00	8026.77	37.25	8008.15	348609.35	43.43
24.00	0.00	0.50	0.00	7989.52	36.03	7971.51	340601.20	42.63
25.00	0.00	0.50	0.00	7953.49	32.90	7937.04	332629.69	41.82
26.00	0.00	0.50	0.00	7920.59	38.30	7901.44	324692.65	40.99
27.00	0.00	0.50	0.00	7882.29	31.76	7866.41	316791.21	40.19
28.00	0.01	0.50	0.01	7850.53	41.04	7830.01	308924.80	39.35
29.00	0.00	0.50	0.00	7809.49	36.99	7791.00	301094.78	38.55
30.00	0.00	0.50	0.00	7772.50	37.96	7753.52	293303.79	37.74
31.00	0.00	0.50	0.00	7734.54	26.14	7721.47	285550.27	36.92
32.00	0.00	0.50	0.00	7708.39	35.04	7690.88	277828.80	36.04
33.00	0.01	0.50	0.01	7673.36	43.54	7651.59	270137.92	35.20
34.00	0.01	0.50	0.01	7629.82	44.53	7607.55	262486.34	34.40
35.00	0.01	0.50	0.01	7585.28	41.33	7564.62	254878.79	33.60
36.00	0.01	0.50	0.01	7543.96	45.57	7521.17	247314.17	32.78
37.00	0.01	0.50	0.01	7498.39	44.55	7476.11	239792.99	31.98
38.00	0.01	0.50	0.01	7453.84	45.68	7431.00	232316.88	31.17
39.00	0.01	0.50	0.01	7408.16	49.95	7383.18	224885.89	30.36
40.00	0.01	0.50	0.01	7358.21	46.28	7335.07	217502.70	29.56
41.00	0.01	0.50	0.01	7311.93	48.29	7287.79	210167.63	28.74
42.00	0.01	0.50	0.01	7263.65	60.12	7233.59	202879.84	27.93
43.00	0.01	0.50	0.01	7203.53	53.83	7176.61	195646.25	27.16
44.00	0.01	0.50	0.01	7149.70	56.68	7121.36	188469.64	26.36
45.00	0.01	0.50	0.01	7093.02	63.33	7061.35	181348.29	25.57
46.00	0.01	0.50	0.01	7029.69	60.50	6999.44	174286.93	24.79
47.00	0.01	0.50	0.01	6969.19	60.45	6938.97	167287.49	24.00
48.00	0.01	0.50	0.01	6908.75	76.25	6870.62	160348.52	23.21
49.00	0.01	0.50	0.01	6832.50	83.49	6790.75	153477.90	22.46
50.00	0.01	0.50	0.01	6749.01	75.93	6711.04	146687.14	21.73
51.00	0.01	0.50	0.01	6673.08	78.78	6633.69	139976.10	20.98
52.00	0.02	0.50	0.02	6594.30	109.94	6539.33	133342.41	20.22
53.00	0.02	0.50	0.02	6484.36	100.25	6434.23	126803.09	19.56
54.00	0.02	0.50	0.02	6384.11	100.72	6333.75	120368.85	18.85
55.00	0.02	0.50	0.02	6283.39	117.14	6224.82	114035.10	18.15
56.00	0.02	0.50	0.02	6166.25	119.65	6106.42	107810.28	17.48
57.00	0.02	0.50	0.02	6046.60	124.88	5984.16	101703.86	16.82
58.00	0.02	0.50	0.02	5921.71	134.63	5854.40	95719.71	16.16
59.00	0.03	0.50	0.03	5787.09	146.27	5713.95	89865.30	15.53
60.00	0.03	0.50	0.03	5640.82	148.20	5566.71	84151.35	14.92
61.00	0.03	0.50	0.03	5492.61	147.09	5419.07	78584.64	14.31
62.00	0.03	0.50	0.03	5345.52	161.12	5264.96	73165.57	13.69
63.00	0.04	0.50	0.04	5184.40	186.68	5091.06	67900.61	13.10
64.00	0.03	0.50	0.03	4997.72	161.55	4916.94	62809.55	12.57
65.00	0.04	0.50	0.04	4836.17	206.40	4732.97	57892.60	11.97
66.00	0.04	0.50	0.04	4629.76	183.97	4537.78	53159.64	11.48
67.00	0.05	0.50	0.05	4445.80	216.58	4337.51	48621.85	10.94
68.00	0.05	0.50	0.05	4229.22	220.86	4118.79	44284.34	10.47
69.00	0.05	0.50	0.05	4008.36	200.03	3908.35	40165.55	10.02
70.00	0.06	0.50	0.06	3808.34	216.89	3699.89	36257.20	9.52
71.00	0.06	0.50	0.06	3591.45	206.74	3488.08	32557.31	9.07
72.00	0.08	0.50	0.08	3384.71	264.67	3252.37	29069.23	8.59
73.00	0.08	0.50	0.08	3120.04	235.13	3002.47	25816.86	8.27
74.00	0.07	0.50	0.07	2884.91	205.04	2782.39	22814.39	7.91
75.00	0.10	0.50	0.09	2679.87	250.85	2554.44	20032.00	7.47
76.00	0.11	0.50	0.10	2429.02	252.16	2302.94	17477.55	7.20
77.00	0.11	0.50	0.10	2176.85	220.41	2066.65	15174.62	6.97
78.00	0.11	0.50	0.10	1956.45	201.47	1855.71	13107.97	6.70
79.00	0.10	0.50	0.09	1754.98	166.28	1671.84	11252.25	6.41
80.00	0.12	0.50	0.12	1588.70	182.91	1497.24	9580.41	6.03
81.00	0.11	0.50	0.11	1405.79	151.37	1330.10	8083.17	5.75
82.00	0.13	0.50	0.13	1254.41	157.60	1175.62	6753.07	5.38
83.00	0.16	0.50	0.15	1096.82	163.72	1014.96	5577.46	5.09
84.00	0.18	0.50	0.17	933.10	157.01	854.59	4562.50	4.89
85.00	0.21	4.78	1.00	776.09	776.09	3707.91	3707.91	4.78

Table E.6 Epidemic Male Lifetable: Herald Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.10	0.30	0.10	10000.00	975.72	9316.99	535619.90	53.56
1.00	0.02	0.50	0.02	9024.28	175.67	8936.44	526302.90	58.32
2.00	0.01	0.50	0.01	8848.61	103.76	8796.73	517366.46	58.47
3.00	0.01	0.50	0.01	8744.85	87.54	8701.08	508569.74	58.16
4.00	0.01	0.50	0.01	8657.31	55.27	8629.67	499868.66	57.74
5.00	0.01	0.50	0.01	8602.03	49.41	8577.33	491238.99	57.11
6.00	0.00	0.50	0.00	8552.62	25.18	8540.03	482661.66	56.43
7.00	0.00	0.50	0.00	8527.44	26.67	8514.11	474121.63	55.60
8.00	0.00	0.50	0.00	8500.78	24.47	8488.54	465607.52	54.77
9.00	0.00	0.50	0.00	8476.30	31.56	8460.53	457118.98	53.93
10.00	0.00	0.50	0.00	8444.75	23.77	8432.86	448658.45	53.13
11.00	0.00	0.50	0.00	8420.97	26.02	8407.96	440225.59	52.28
12.00	0.00	0.50	0.00	8394.95	25.67	8382.12	431817.63	51.44
13.00	0.00	0.50	0.00	8369.29	20.35	8359.11	423435.51	50.59
14.00	0.00	0.50	0.00	8348.93	27.56	8335.15	415076.40	49.72
15.00	0.00	0.50	0.00	8321.38	30.87	8305.94	406741.25	48.88
16.00	0.00	0.50	0.00	8290.50	26.95	8277.03	398435.31	48.06
17.00	0.00	0.50	0.00	8263.55	36.17	8245.47	390158.28	47.21
18.00	0.01	0.50	0.01	8227.38	48.42	8203.17	381912.82	46.42
19.00	0.01	0.50	0.01	8178.96	59.09	8149.42	373709.65	45.69
20.00	0.01	0.50	0.01	8119.87	56.44	8091.65	365560.23	45.02
21.00	0.01	0.50	0.01	8063.43	43.48	8041.69	357468.57	44.33
22.00	0.01	0.50	0.01	8019.95	40.98	7999.46	349426.88	43.57
23.00	0.00	0.50	0.00	7978.97	37.44	7960.25	341427.42	42.79
24.00	0.01	0.50	0.01	7941.53	53.03	7915.02	333467.17	41.99
25.00	0.01	0.50	0.01	7888.50	40.01	7868.50	325552.15	41.27
26.00	0.01	0.50	0.01	7848.49	51.16	7822.91	317683.65	40.48
27.00	0.01	0.50	0.01	7797.33	53.25	7770.70	309860.74	39.74
28.00	0.01	0.50	0.01	7744.08	52.00	7718.08	302090.04	39.01
29.00	0.01	0.50	0.01	7692.07	49.81	7667.17	294371.96	38.27
30.00	0.01	0.50	0.01	7642.26	43.05	7620.73	286704.80	37.52
31.00	0.01	0.50	0.01	7599.21	40.67	7578.88	279084.06	36.73
32.00	0.01	0.50	0.01	7558.54	47.08	7535.00	271505.18	35.92
33.00	0.01	0.50	0.01	7511.46	39.20	7491.86	263970.18	35.14
34.00	0.01	0.50	0.01	7472.27	49.41	7447.56	256478.32	34.32
35.00	0.01	0.50	0.01	7422.85	40.44	7402.63	249030.76	33.55
36.00	0.01	0.50	0.01	7382.41	56.19	7354.32	241628.13	32.73
37.00	0.01	0.50	0.01	7326.22	55.71	7298.37	234273.81	31.98
38.00	0.01	0.50	0.01	7270.52	46.99	7247.02	226975.44	31.22
39.00	0.01	0.50	0.01	7223.53	53.56	7196.75	219728.42	30.42
40.00	0.01	0.50	0.01	7169.97	52.34	7143.80	212531.68	29.64
41.00	0.01	0.50	0.01	7117.63	51.35	7091.96	205387.88	28.86
42.00	0.01	0.50	0.01	7066.28	63.78	7034.39	198295.92	28.06
43.00	0.01	0.50	0.01	7002.50	54.72	6975.14	191261.53	27.31
44.00	0.01	0.50	0.01	6947.78	57.46	6919.05	184286.40	26.52
45.00	0.01	0.50	0.01	6890.32	67.78	6856.42	177367.35	25.74
46.00	0.01	0.50	0.01	6822.53	57.72	6793.67	170510.92	24.99
47.00	0.01	0.50	0.01	6764.81	89.35	6720.14	163717.25	24.20
48.00	0.01	0.50	0.01	6675.46	70.53	6640.20	156997.11	23.52
49.00	0.02	0.50	0.01	6604.93	98.86	6555.50	150356.92	22.76
50.00	0.01	0.50	0.01	6506.07	67.17	6472.48	143801.42	22.10
51.00	0.01	0.50	0.01	6438.90	76.02	6400.89	137328.94	21.33
52.00	0.01	0.50	0.01	6362.88	93.35	6316.20	130928.05	20.58
53.00	0.01	0.50	0.01	6269.53	90.99	6224.03	124611.85	19.88
54.00	0.02	0.50	0.02	6178.54	139.29	6108.89	118387.82	19.16
55.00	0.02	0.50	0.02	6039.24	103.35	5987.57	112278.93	18.59
56.00	0.02	0.50	0.02	5935.90	100.67	5885.56	106291.36	17.91
57.00	0.02	0.50	0.02	5835.23	125.03	5772.71	100405.80	17.21
58.00	0.03	0.50	0.02	5710.20	141.59	5639.40	94633.08	16.57
59.00	0.02	0.50	0.02	5568.60	108.89	5514.16	88993.68	15.98
60.00	0.02	0.50	0.02	5459.71	134.63	5392.39	83479.52	15.29
61.00	0.03	0.50	0.03	5325.08	155.12	5247.52	78087.13	14.66
62.00	0.03	0.50	0.03	5169.96	175.06	5082.42	72839.61	14.09
63.00	0.04	0.50	0.03	4994.89	174.77	4907.51	67757.19	13.57
64.00	0.04	0.50	0.04	4820.12	195.27	4722.48	62849.68	13.04
65.00	0.04	0.50	0.04	4624.85	186.01	4531.84	58127.20	12.57
66.00	0.05	0.50	0.05	4438.84	199.89	4338.89	53595.36	12.07
67.00	0.04	0.50	0.04	4238.94	173.19	4152.35	49256.46	11.62
68.00	0.06	0.50	0.06	4065.75	224.96	3953.27	45104.11	11.09
69.00	0.05	0.50	0.05	3840.79	189.92	3745.83	41150.84	10.71
70.00	0.05	0.50	0.05	3650.88	178.95	3561.40	37405.01	10.25
71.00	0.05	0.50	0.05	3471.93	176.34	3383.76	33843.61	9.75
72.00	0.07	0.50	0.06	3295.59	211.29	3189.94	30459.85	9.24
73.00	0.07	0.50	0.07	3084.30	212.22	2978.19	27269.91	8.84
74.00	0.08	0.50	0.08	2872.08	226.38	2758.89	24291.72	8.46
75.00	0.09	0.50	0.09	2645.70	237.94	2526.73	21532.83	8.14
76.00	0.08	0.50	0.08	2407.76	189.65	2312.93	19006.10	7.89
77.00	0.09	0.50	0.09	2218.11	193.26	2121.48	16693.17	7.53
78.00	0.12	0.50	0.11	2024.85	222.10	1913.80	14571.70	7.20
79.00	0.10	0.50	0.09	1802.74	169.64	1717.93	12657.90	7.02
80.00	0.13	0.50	0.12	1633.11	193.01	1536.60	10939.97	6.70
81.00	0.11	0.50	0.10	1440.10	148.32	1365.94	9403.37	6.53
82.00	0.15	0.50	0.14	1291.78	185.47	1199.04	8037.43	6.22
83.00	0.15	0.50	0.14	1106.31	155.93	1028.35	6838.39	6.18
84.00	0.13	0.50	0.12	950.38	113.13	893.82	5810.04	6.11
85.00	0.17	5.87	1.00	837.26	837.26	4916.22	4916.22	5.87

Table E.7 Pre-epidemic Female Lifetable: Fall Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.10	0.31	0.09	10000.00	919.05	9365.85	560414.28	56.04
1.00	0.02	0.50	0.02	9080.95	204.78	8978.56	551048.43	60.68
2.00	0.01	0.50	0.01	8876.16	97.24	8827.55	542069.87	61.07
3.00	0.01	0.50	0.01	8778.93	79.47	8739.19	533242.32	60.74
4.00	0.00	0.50	0.00	8699.45	42.71	8678.10	524503.13	60.29
5.00	0.00	0.50	0.00	8656.74	40.01	8636.74	515825.03	59.59
6.00	0.00	0.50	0.00	8616.74	37.18	8598.15	507188.29	58.86
7.00	0.00	0.50	0.00	8579.56	24.12	8567.50	498590.15	58.11
8.00	0.00	0.50	0.00	8555.44	16.68	8547.10	490022.65	57.28
9.00	0.00	0.50	0.00	8538.76	15.75	8530.88	481475.55	56.39
10.00	0.00	0.50	0.00	8523.01	21.73	8512.14	472944.67	55.49
11.00	0.00	0.50	0.00	8501.28	18.93	8491.81	464432.53	54.63
12.00	0.00	0.50	0.00	8482.35	17.85	8473.42	455940.71	53.75
13.00	0.00	0.50	0.00	8464.49	15.20	8456.90	447467.29	52.86
14.00	0.00	0.50	0.00	8449.30	15.93	8441.33	439010.39	51.96
15.00	0.00	0.50	0.00	8433.37	22.18	8422.28	430569.06	51.06
16.00	0.00	0.50	0.00	8411.19	22.94	8399.72	422146.78	50.19
17.00	0.00	0.50	0.00	8388.25	32.12	8372.19	413747.06	49.32
18.00	0.00	0.50	0.00	8356.13	32.54	8339.86	405374.87	48.51
19.00	0.00	0.50	0.00	8323.59	31.35	8307.91	397035.01	47.70
20.00	0.00	0.50	0.00	8292.23	31.12	8276.67	388727.10	46.88
21.00	0.00	0.50	0.00	8261.11	33.96	8244.13	380450.42	46.05
22.00	0.00	0.50	0.00	8227.16	32.03	8211.14	372206.29	45.24
23.00	0.00	0.50	0.00	8195.12	39.48	8175.38	363995.15	44.42
24.00	0.00	0.50	0.00	8155.64	34.52	8138.38	355819.77	43.63
25.00	0.00	0.50	0.00	8121.12	30.45	8105.89	347681.38	42.81
26.00	0.00	0.50	0.00	8090.67	36.17	8072.58	339575.49	41.97
27.00	0.00	0.50	0.00	8054.49	30.00	8039.50	331502.91	41.16
28.00	0.00	0.50	0.00	8024.50	33.93	8007.54	323463.41	40.31
29.00	0.00	0.50	0.00	7990.57	33.51	7973.81	315455.87	39.48
30.00	0.01	0.50	0.01	7957.06	42.03	7936.04	307482.06	38.64
31.00	0.01	0.50	0.01	7915.03	42.07	7893.99	299546.02	37.85
32.00	0.00	0.50	0.00	7872.95	36.68	7854.61	291652.03	37.04
33.00	0.00	0.50	0.00	7836.27	36.14	7818.20	283797.41	36.22
34.00	0.01	0.50	0.01	7800.14	42.57	7778.85	275979.21	35.38
35.00	0.01	0.50	0.01	7757.56	39.72	7737.70	268200.36	34.57
36.00	0.01	0.50	0.01	7717.85	48.13	7693.78	260462.66	33.75
37.00	0.01	0.50	0.01	7669.71	53.60	7642.91	252768.88	32.96
38.00	0.01	0.50	0.01	7616.11	46.52	7592.85	245125.96	32.19
39.00	0.01	0.50	0.01	7569.59	51.61	7543.79	237533.11	31.38
40.00	0.01	0.50	0.01	7517.98	50.83	7492.57	229989.32	30.59
41.00	0.01	0.50	0.01	7467.16	56.36	7438.98	222496.75	29.80
42.00	0.01	0.50	0.01	7410.80	60.12	7380.74	215057.78	29.02
43.00	0.01	0.50	0.01	7350.67	59.66	7320.85	207677.04	28.25
44.00	0.01	0.50	0.01	7291.02	54.78	7263.63	200356.20	27.48
45.00	0.01	0.50	0.01	7236.24	54.21	7209.13	193092.57	26.68
46.00	0.01	0.50	0.01	7182.03	60.85	7151.60	185883.43	25.88
47.00	0.01	0.50	0.01	7121.18	62.91	7089.72	178731.83	25.10
48.00	0.01	0.50	0.01	7058.26	73.74	7021.39	171642.11	24.32
49.00	0.01	0.50	0.01	6984.52	73.53	6947.76	164620.72	23.57
50.00	0.01	0.50	0.01	6910.99	90.50	6865.75	157672.96	22.81
51.00	0.01	0.50	0.01	6820.50	79.22	6780.89	150807.21	22.11
52.00	0.01	0.50	0.01	6741.28	84.07	6699.24	144026.33	21.36
53.00	0.01	0.50	0.01	6657.21	87.12	6613.65	137327.09	20.63
54.00	0.01	0.50	0.01	6570.09	95.84	6522.17	130713.44	19.90
55.00	0.01	0.50	0.01	6474.25	92.84	6427.83	124191.27	19.18
56.00	0.02	0.50	0.02	6381.41	116.35	6323.24	117763.44	18.45
57.00	0.02	0.50	0.02	6265.06	105.60	6212.27	111440.20	17.79
58.00	0.02	0.50	0.02	6159.47	121.37	6098.78	105227.94	17.08
59.00	0.02	0.50	0.02	6038.10	110.22	5982.98	99129.15	16.42
60.00	0.02	0.50	0.02	5927.87	137.30	5859.22	93146.17	15.71
61.00	0.02	0.50	0.02	5790.57	137.78	5721.68	87286.95	15.07
62.00	0.03	0.50	0.03	5652.79	156.58	5574.50	81565.27	14.43
63.00	0.03	0.50	0.03	5496.21	161.30	5415.56	75990.78	13.83
64.00	0.03	0.50	0.03	5334.90	161.23	5254.29	70575.22	13.23
65.00	0.03	0.50	0.03	5173.68	166.22	5090.57	65320.93	12.63
66.00	0.03	0.50	0.03	5007.46	163.20	4925.86	60230.36	12.03
67.00	0.04	0.50	0.03	4844.26	168.77	4759.87	55304.50	11.42
68.00	0.04	0.50	0.04	4675.49	177.36	4586.80	50544.63	10.81
69.00	0.04	0.50	0.04	4498.12	189.91	4403.17	45957.83	10.22
70.00	0.05	0.50	0.05	4308.21	206.39	4205.01	41554.66	9.65
71.00	0.05	0.50	0.05	4101.82	195.26	4004.19	37349.65	9.11
72.00	0.07	0.50	0.07	3906.56	260.80	3776.16	33345.46	8.54
73.00	0.07	0.50	0.07	3645.75	258.76	3516.38	29569.31	8.11
74.00	0.08	0.50	0.08	3387.00	267.37	3253.31	26052.93	7.69
75.00	0.09	0.50	0.08	3119.63	262.04	2988.61	22799.62	7.31
76.00	0.11	0.50	0.10	2857.59	287.16	2714.01	19811.01	6.93
77.00	0.10	0.50	0.10	2570.43	249.85	2445.51	17097.00	6.65
78.00	0.11	0.50	0.11	2320.58	246.69	2197.24	14651.50	6.31
79.00	0.11	0.50	0.11	2073.89	224.47	1961.65	12454.26	6.01
80.00	0.13	0.50	0.12	1849.42	224.17	1737.33	10492.61	5.67
81.00	0.13	0.50	0.12	1625.24	191.81	1529.34	8755.28	5.39
82.00	0.14	0.50	0.13	1433.43	188.62	1339.12	7225.94	5.04
83.00	0.17	0.50	0.15	1244.81	192.94	1148.34	5886.82	4.73
84.00	0.20	0.50	0.18	1051.87	191.12	956.31	4738.48	4.50
85.00	0.23	4.39	1.00	860.76	860.76	3782.16	3782.16	4.39

Table E.8 Epidemic Female Lifetable: Fall Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.12	0.31	0.11	10000.00	1118.46	9228.27	412802.21	41.28
1.00	0.04	0.50	0.04	8881.54	326.47	8718.31	403573.95	45.44
2.00	0.03	0.50	0.03	8555.07	263.42	8423.36	394855.64	46.15
3.00	0.02	0.50	0.02	8291.65	191.04	8196.13	386432.28	46.60
4.00	0.02	0.50	0.02	8100.61	139.83	8030.69	378236.15	46.69
5.00	0.01	0.50	0.01	7960.78	86.86	7917.35	370205.45	46.50
6.00	0.01	0.50	0.01	7873.92	80.04	7833.90	362288.10	46.01
7.00	0.01	0.50	0.01	7793.88	77.54	7755.11	354454.20	45.48
8.00	0.01	0.50	0.01	7716.34	50.74	7690.98	346699.09	44.93
9.00	0.01	0.50	0.01	7665.61	55.28	7637.96	339008.12	44.22
10.00	0.01	0.50	0.01	7610.32	54.42	7583.11	331370.15	43.54
11.00	0.01	0.50	0.01	7555.90	39.52	7536.14	323787.04	42.85
12.00	0.01	0.50	0.01	7516.38	46.01	7493.37	316250.90	42.07
13.00	0.00	0.50	0.00	7470.37	37.25	7451.74	308757.53	41.33
14.00	0.01	0.50	0.01	7433.12	51.51	7407.36	301305.78	40.54
15.00	0.01	0.50	0.01	7381.61	74.83	7344.19	293898.42	39.81
16.00	0.01	0.50	0.01	7306.78	72.21	7270.67	286554.23	39.22
17.00	0.01	0.50	0.01	7234.57	63.18	7202.98	279283.56	38.60
18.00	0.01	0.50	0.01	7171.39	70.46	7136.16	272080.58	37.94
19.00	0.01	0.50	0.01	7100.93	69.28	7066.28	264944.42	37.31
20.00	0.01	0.50	0.01	7031.64	79.97	6991.66	257878.14	36.67
21.00	0.01	0.50	0.01	6951.67	97.72	6902.81	250886.48	36.09
22.00	0.01	0.50	0.01	6853.95	84.58	6811.66	243983.67	35.60
23.00	0.01	0.50	0.01	6769.37	96.95	6720.89	237172.02	35.04
24.00	0.02	0.50	0.02	6672.42	101.19	6621.82	230451.12	34.54
25.00	0.02	0.50	0.02	6571.22	123.18	6509.64	223829.30	34.06
26.00	0.02	0.50	0.02	6448.05	128.76	6383.67	217319.67	33.70
27.00	0.02	0.50	0.02	6319.29	117.10	6260.74	210936.00	33.38
28.00	0.02	0.50	0.02	6202.19	134.29	6135.04	204675.26	33.00
29.00	0.02	0.50	0.02	6067.90	109.45	6013.17	198540.21	32.72
30.00	0.02	0.50	0.02	5958.45	125.29	5895.80	192527.04	32.31
31.00	0.02	0.50	0.02	5833.16	106.30	5780.01	186631.24	31.99
32.00	0.02	0.50	0.02	5726.86	102.33	5675.69	180851.23	31.58
33.00	0.02	0.50	0.02	5624.53	90.43	5579.31	175175.53	31.14
34.00	0.02	0.50	0.02	5534.10	94.90	5486.65	169596.22	30.65
35.00	0.02	0.50	0.02	5439.20	83.84	5397.28	164109.57	30.17
36.00	0.01	0.50	0.01	5355.35	69.75	5320.48	158712.30	29.64
37.00	0.02	0.50	0.02	5285.60	80.85	5245.18	153391.82	29.02
38.00	0.01	0.50	0.01	5204.75	71.15	5169.18	148146.64	28.46
39.00	0.01	0.50	0.01	5133.61	72.01	5097.60	142977.46	27.85
40.00	0.01	0.50	0.01	5061.59	59.36	5031.91	137879.86	27.24
41.00	0.01	0.50	0.01	5002.23	57.18	4973.64	132847.95	26.56
42.00	0.01	0.50	0.01	4945.05	65.15	4912.48	127874.31	25.86
43.00	0.01	0.50	0.01	4879.90	64.28	4847.76	122961.83	25.20
44.00	0.02	0.50	0.02	4815.62	72.73	4779.25	118114.07	24.53
45.00	0.02	0.50	0.02	4742.89	73.37	4706.21	113334.82	23.90
46.00	0.01	0.50	0.01	4669.52	67.40	4635.82	108628.61	23.26
47.00	0.02	0.50	0.02	4602.12	72.50	4565.87	103992.79	22.60
48.00	0.02	0.50	0.02	4529.62	70.96	4494.14	99426.92	21.95
49.00	0.02	0.50	0.02	4458.66	79.58	4418.87	94932.78	21.29
50.00	0.02	0.50	0.02	4379.08	74.48	4341.84	90513.91	20.67
51.00	0.02	0.50	0.02	4304.60	65.64	4271.78	86172.06	20.02
52.00	0.02	0.50	0.02	4238.95	81.75	4198.08	81900.29	19.32
53.00	0.02	0.50	0.02	4157.21	82.59	4115.92	77702.21	18.69
54.00	0.02	0.50	0.02	4074.62	97.21	4026.02	73586.29	18.06
55.00	0.02	0.50	0.02	3977.42	86.96	3933.93	69560.27	17.49
56.00	0.02	0.50	0.02	3890.45	94.42	3843.24	65626.34	16.87
57.00	0.03	0.50	0.02	3796.03	94.20	3748.94	61783.09	16.28
58.00	0.03	0.50	0.03	3701.84	109.82	3646.93	58034.16	15.68
59.00	0.03	0.50	0.03	3592.02	92.91	3545.56	54387.23	15.14
60.00	0.03	0.50	0.03	3499.10	116.49	3440.86	50841.67	14.53
61.00	0.03	0.50	0.03	3382.61	93.02	3336.11	47400.81	14.01
62.00	0.03	0.50	0.03	3289.60	106.61	3236.29	44064.70	13.40
63.00	0.04	0.50	0.04	3182.99	120.71	3122.63	40828.41	12.83
64.00	0.04	0.50	0.04	3062.28	126.33	2999.11	37705.78	12.31
65.00	0.05	0.50	0.05	2935.95	138.00	2866.94	34706.67	11.82
66.00	0.04	0.50	0.04	2797.94	101.09	2747.40	31839.72	11.38
67.00	0.05	0.50	0.05	2696.86	123.71	2635.00	29092.33	10.79
68.00	0.05	0.50	0.05	2573.14	132.30	2506.99	26457.33	10.28
69.00	0.05	0.50	0.05	2440.84	115.96	2382.86	23950.34	9.81
70.00	0.06	0.50	0.06	2324.88	131.56	2259.10	21567.48	9.28
71.00	0.05	0.50	0.05	2193.31	116.56	2135.03	19308.38	8.80
72.00	0.08	0.50	0.07	2076.75	154.36	1999.57	17173.35	8.27
73.00	0.08	0.50	0.07	1922.39	142.73	1851.02	15173.78	7.89
74.00	0.09	0.50	0.09	1779.66	160.50	1699.41	13322.76	7.49
75.00	0.10	0.50	0.10	1619.17	155.51	1541.41	11623.35	7.18
76.00	0.12	0.50	0.11	1463.66	163.37	1381.98	10081.93	6.89
77.00	0.10	0.50	0.10	1300.29	127.22	1236.68	8699.96	6.69
78.00	0.13	0.50	0.12	1173.07	142.52	1101.81	7463.27	6.36
79.00	0.11	0.50	0.10	1030.55	104.88	978.11	6361.46	6.17
80.00	0.13	0.50	0.12	925.67	109.27	871.04	5383.35	5.82
81.00	0.12	0.50	0.11	816.40	89.74	771.53	4512.32	5.53
82.00	0.13	0.50	0.13	726.66	91.09	681.12	3740.79	5.15
83.00	0.16	0.50	0.15	635.57	93.06	589.05	3059.67	4.81
84.00	0.18	0.50	0.17	542.52	89.94	497.55	2470.62	4.55
85.00	0.23	4.36	1.00	452.57	452.57	1973.08	1973.08	4.36

Table E.9 Pre-epidemic Male Lifetable: Fall Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.12	0.30	0.11	10000.00	1105.16	9226.39	526055.61	52.61
1.00	0.02	0.50	0.02	8894.84	196.32	8796.68	516829.22	58.10
2.00	0.01	0.50	0.01	8698.52	107.60	8644.72	508032.54	58.40
3.00	0.01	0.50	0.01	8590.92	78.82	8551.51	499387.82	58.13
4.00	0.01	0.50	0.01	8512.10	51.13	8486.53	490836.31	57.66
5.00	0.00	0.50	0.00	8460.97	40.36	8440.79	482349.78	57.01
6.00	0.00	0.50	0.00	8420.61	31.18	8405.01	473908.99	56.28
7.00	0.00	0.50	0.00	8389.42	25.85	8376.50	465503.98	55.49
8.00	0.00	0.50	0.00	8363.57	19.20	8353.97	457127.48	54.66
9.00	0.00	0.50	0.00	8344.38	17.19	8335.78	448773.51	53.78
10.00	0.00	0.50	0.00	8327.19	11.13	8321.62	440437.72	52.89
11.00	0.00	0.50	0.00	8316.06	15.93	8308.09	432116.10	51.96
12.00	0.00	0.50	0.00	8300.13	18.47	8290.89	423808.01	51.06
13.00	0.00	0.50	0.00	8281.65	19.70	8271.80	415517.12	50.17
14.00	0.00	0.50	0.00	8261.95	21.77	8251.07	407245.31	49.29
15.00	0.00	0.50	0.00	8240.18	22.53	8228.92	398994.25	48.42
16.00	0.00	0.50	0.00	8217.65	22.90	8206.20	390765.33	47.55
17.00	0.00	0.50	0.00	8194.75	34.91	8177.30	382559.13	46.68
18.00	0.00	0.50	0.00	8159.84	32.68	8143.50	374381.83	45.88
19.00	0.00	0.50	0.00	8127.16	32.63	8110.85	366238.33	45.06
20.00	0.00	0.50	0.00	8094.53	32.35	8078.36	358127.49	44.24
21.00	0.00	0.50	0.00	8062.19	24.00	8050.19	350049.13	43.42
22.00	0.00	0.50	0.00	8038.19	25.03	8025.67	341998.94	42.55
23.00	0.00	0.50	0.00	8013.16	34.90	7995.71	333973.27	41.68
24.00	0.00	0.50	0.00	7978.25	32.47	7962.02	325977.56	40.86
25.00	0.00	0.50	0.00	7945.79	34.33	7928.62	318015.54	40.02
26.00	0.00	0.50	0.00	7911.45	36.68	7893.11	310086.92	39.19
27.00	0.00	0.50	0.00	7874.78	33.72	7857.92	302193.81	38.37
28.00	0.00	0.50	0.00	7841.06	33.64	7824.24	294335.89	37.54
29.00	0.01	0.50	0.01	7807.42	44.13	7785.36	286511.65	36.70
30.00	0.01	0.50	0.01	7763.29	45.61	7740.49	278726.30	35.90
31.00	0.01	0.50	0.01	7717.69	41.38	7697.00	270985.81	35.11
32.00	0.01	0.50	0.01	7676.31	46.79	7652.91	263288.81	34.30
33.00	0.01	0.50	0.01	7629.52	41.51	7608.76	255635.90	33.51
34.00	0.01	0.50	0.01	7588.00	39.13	7568.44	248027.14	32.69
35.00	0.01	0.50	0.01	7548.87	42.00	7527.88	240458.70	31.85
36.00	0.01	0.50	0.01	7506.88	44.46	7484.65	232930.82	31.03
37.00	0.01	0.50	0.01	7462.42	56.88	7433.98	225446.18	30.21
38.00	0.01	0.50	0.01	7405.54	50.16	7380.46	218012.20	29.44
39.00	0.01	0.50	0.01	7355.38	45.27	7332.74	210631.74	28.64
40.00	0.01	0.50	0.01	7310.11	59.76	7280.23	203299.00	27.81
41.00	0.01	0.50	0.01	7250.35	49.40	7225.65	196018.76	27.04
42.00	0.01	0.50	0.01	7200.95	58.03	7171.94	188793.11	26.22
43.00	0.01	0.50	0.01	7142.92	66.74	7109.56	181621.17	25.43
44.00	0.01	0.50	0.01	7076.19	63.44	7044.47	174511.62	24.66
45.00	0.01	0.50	0.01	7012.75	79.10	6973.20	167467.15	23.88
46.00	0.01	0.50	0.01	6933.65	68.63	6899.33	160493.95	23.15
47.00	0.01	0.50	0.01	6865.02	75.87	6827.09	153594.61	22.37
48.00	0.01	0.50	0.01	6789.15	73.14	6752.58	146767.53	21.62
49.00	0.01	0.50	0.01	6716.01	91.46	6670.28	140014.95	20.85
50.00	0.02	0.50	0.02	6624.55	110.88	6569.11	133344.66	20.13
51.00	0.01	0.50	0.01	6513.67	83.00	6472.17	126775.55	19.46
52.00	0.02	0.50	0.02	6430.67	113.45	6373.95	120303.38	18.71
53.00	0.02	0.50	0.02	6317.22	121.69	6256.38	113929.44	18.03
54.00	0.02	0.50	0.02	6195.53	115.51	6137.78	107673.06	17.38
55.00	0.02	0.50	0.02	6080.02	130.50	6014.77	101535.28	16.70
56.00	0.02	0.50	0.02	5949.53	135.38	5881.84	95520.51	16.06
57.00	0.03	0.50	0.02	5814.15	144.21	5742.04	89638.67	15.42
58.00	0.03	0.50	0.03	5669.94	150.37	5594.75	83896.63	14.80
59.00	0.03	0.50	0.03	5519.57	145.24	5446.95	78301.87	14.19
60.00	0.03	0.50	0.03	5374.32	167.96	5290.34	72854.93	13.56
61.00	0.03	0.50	0.03	5206.36	171.09	5120.82	67564.58	12.98
62.00	0.04	0.50	0.04	5035.27	177.61	4946.46	62443.77	12.40
63.00	0.03	0.50	0.03	4857.66	156.00	4779.66	57497.30	11.84
64.00	0.04	0.50	0.04	4701.66	195.94	4603.69	52717.65	11.21
65.00	0.04	0.50	0.04	4505.72	193.31	4409.07	48113.96	10.68
66.00	0.05	0.50	0.05	4312.41	208.03	4208.40	43704.89	10.13
67.00	0.05	0.50	0.05	4104.38	212.65	3998.06	39496.50	9.62
68.00	0.06	0.50	0.06	3891.73	227.81	3777.82	35498.44	9.12
69.00	0.07	0.50	0.07	3663.92	238.88	3544.48	31720.61	8.66
70.00	0.07	0.50	0.07	3425.04	231.90	3309.09	28176.13	8.23
71.00	0.06	0.50	0.06	3193.14	187.64	3099.32	24867.04	7.79
72.00	0.09	0.50	0.09	3005.50	264.21	2873.40	21767.72	7.24
73.00	0.10	0.50	0.09	2741.30	254.84	2613.87	18894.32	6.89
74.00	0.11	0.50	0.10	2486.45	248.17	2362.37	16280.44	6.55
75.00	0.11	0.50	0.10	2238.28	226.24	2125.16	13918.08	6.22
76.00	0.12	0.50	0.11	2012.04	230.56	1896.76	11792.91	5.86
77.00	0.14	0.50	0.13	1781.48	232.88	1665.04	9896.15	5.56
78.00	0.14	0.50	0.13	1548.59	196.58	1450.31	8231.12	5.32
79.00	0.15	0.50	0.14	1352.02	190.20	1256.91	6780.81	5.02
80.00	0.15	0.50	0.14	1161.81	157.29	1083.17	5523.90	4.75
81.00	0.15	0.50	0.14	1004.52	140.20	934.42	4440.73	4.42
82.00	0.20	0.50	0.18	864.33	156.04	786.31	3506.31	4.06
83.00	0.21	0.50	0.19	708.29	134.05	641.26	2720.00	3.84
84.00	0.24	0.50	0.22	574.24	124.31	512.08	2078.74	3.62
85.00	0.29	3.48	1.00	449.93	449.93	1566.65	1566.65	3.48

Table E.10 Epidemic Male Lifetable: Fall Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.15	0.30	0.14	10000.00	1382.93	9031.95	395807.62	39.58
1.00	0.04	0.50	0.04	8617.07	308.56	8462.79	386775.67	44.88
2.00	0.03	0.50	0.03	8308.51	242.64	8187.19	378312.87	45.53
3.00	0.02	0.50	0.02	8065.87	162.11	7984.81	370125.68	45.89
4.00	0.01	0.50	0.01	7903.76	110.17	7848.67	362140.87	45.82
5.00	0.01	0.50	0.01	7793.59	82.50	7752.34	354292.20	45.46
6.00	0.01	0.50	0.01	7711.09	71.77	7675.20	346539.86	44.94
7.00	0.01	0.50	0.01	7639.32	47.95	7615.34	338864.66	44.36
8.00	0.01	0.50	0.01	7591.36	45.53	7568.60	331249.32	43.64
9.00	0.01	0.50	0.01	7545.83	40.99	7525.33	323680.72	42.90
10.00	0.01	0.50	0.01	7504.84	47.56	7481.06	316155.39	42.13
11.00	0.00	0.50	0.00	7457.28	29.52	7442.52	308674.33	41.39
12.00	0.00	0.50	0.00	7427.77	35.01	7410.26	301231.80	40.55
13.00	0.01	0.50	0.01	7392.76	40.02	7372.75	293821.54	39.74
14.00	0.01	0.50	0.01	7352.74	43.83	7330.82	286448.79	38.96
15.00	0.01	0.50	0.01	7308.91	62.96	7277.43	279117.97	38.19
16.00	0.01	0.50	0.01	7245.94	61.71	7215.09	271840.54	37.52
17.00	0.01	0.50	0.01	7184.23	78.96	7144.76	264625.45	36.83
18.00	0.01	0.50	0.01	7105.28	91.20	7059.68	257480.69	36.24
19.00	0.01	0.50	0.01	7014.08	84.89	6971.64	250421.01	35.70
20.00	0.01	0.50	0.01	6929.19	65.24	6896.57	243449.38	35.13
21.00	0.01	0.50	0.01	6863.95	81.38	6823.26	236552.80	34.46
22.00	0.01	0.50	0.01	6782.57	82.86	6741.14	229729.54	33.87
23.00	0.01	0.50	0.01	6699.72	98.63	6650.40	222988.40	33.28
24.00	0.02	0.50	0.02	6601.08	103.51	6549.33	216338.00	32.77
25.00	0.02	0.50	0.02	6497.58	113.58	6440.79	209788.67	32.29
26.00	0.02	0.50	0.02	6383.99	135.03	6316.48	203347.88	31.85
27.00	0.02	0.50	0.02	6248.97	124.59	6186.67	197031.40	31.53
28.00	0.02	0.50	0.02	6124.37	130.14	6059.30	190844.73	31.16
29.00	0.02	0.50	0.02	5994.23	134.30	5927.08	184785.43	30.83
30.00	0.02	0.50	0.02	5859.94	124.06	5797.91	178858.34	30.52
31.00	0.02	0.50	0.02	5735.88	110.90	5680.43	173060.43	30.17
32.00	0.02	0.50	0.02	5624.97	111.39	5569.28	167380.01	29.76
33.00	0.02	0.50	0.02	5513.58	106.15	5460.51	161810.73	29.35
34.00	0.02	0.50	0.02	5407.43	97.17	5358.85	156350.22	28.91
35.00	0.02	0.50	0.02	5310.26	89.71	5265.41	150991.38	28.43
36.00	0.02	0.50	0.02	5220.56	79.64	5180.74	145725.97	27.91
37.00	0.01	0.50	0.01	5140.91	68.90	5106.47	140545.23	27.34
38.00	0.01	0.50	0.01	5072.02	71.40	5036.31	135438.76	26.70
39.00	0.01	0.50	0.01	5000.61	73.87	4963.68	130402.45	26.08
40.00	0.01	0.50	0.01	4926.74	67.44	4893.02	125438.77	25.46
41.00	0.01	0.50	0.01	4859.30	65.88	4826.36	120545.76	24.81
42.00	0.02	0.50	0.02	4793.42	73.52	4756.66	115719.40	24.14
43.00	0.02	0.50	0.02	4719.90	71.99	4683.91	110962.74	23.51
44.00	0.02	0.50	0.02	4647.91	70.76	4612.53	106278.84	22.87
45.00	0.02	0.50	0.02	4577.15	73.76	4540.27	101666.30	22.21
46.00	0.02	0.50	0.02	4503.39	71.98	4467.40	97126.03	21.57
47.00	0.02	0.50	0.02	4431.42	73.87	4394.48	92658.63	20.91
48.00	0.02	0.50	0.02	4357.55	77.61	4318.74	88264.14	20.26
49.00	0.02	0.50	0.02	4279.94	78.79	4240.54	83945.40	19.61
50.00	0.02	0.50	0.02	4201.15	71.40	4165.45	79704.86	18.97
51.00	0.02	0.50	0.02	4129.74	80.34	4089.57	75539.41	18.29
52.00	0.03	0.50	0.02	4049.40	100.49	3999.16	71449.84	17.64
53.00	0.02	0.50	0.02	3948.91	82.05	3907.89	67450.68	17.08
54.00	0.02	0.50	0.02	3866.86	89.86	3821.93	63542.79	16.43
55.00	0.02	0.50	0.02	3777.00	85.41	3734.30	59720.86	15.81
56.00	0.03	0.50	0.03	3691.59	104.53	3639.33	55986.57	15.17
57.00	0.03	0.50	0.03	3587.06	95.87	3539.13	52347.24	14.59
58.00	0.03	0.50	0.03	3491.19	116.33	3433.02	48808.11	13.98
59.00	0.03	0.50	0.03	3374.86	109.42	3320.14	45375.09	13.45
60.00	0.03	0.50	0.03	3265.43	110.55	3210.16	42054.95	12.88
61.00	0.04	0.50	0.04	3154.88	122.16	3093.80	38844.79	12.31
62.00	0.04	0.50	0.04	3032.71	113.11	2976.16	35750.99	11.79
63.00	0.05	0.50	0.04	2919.61	130.91	2854.16	32774.83	11.23
64.00	0.05	0.50	0.05	2788.70	143.32	2717.04	29920.68	10.73
65.00	0.05	0.50	0.05	2645.38	128.24	2581.26	27203.64	10.28
66.00	0.06	0.50	0.05	2517.13	136.41	2448.93	24622.38	9.78
67.00	0.06	0.50	0.06	2380.73	134.76	2313.34	22173.45	9.31
68.00	0.07	0.50	0.07	2245.96	151.55	2170.19	19860.11	8.84
69.00	0.07	0.50	0.07	2094.42	138.27	2025.28	17689.92	8.45
70.00	0.08	0.50	0.08	1956.15	156.79	1877.75	15664.64	8.01
71.00	0.08	0.50	0.07	1799.36	130.09	1734.31	13786.88	7.66
72.00	0.10	0.50	0.09	1669.27	154.32	1592.11	12052.57	7.22
73.00	0.10	0.50	0.09	1514.95	139.54	1445.18	10460.46	6.90
74.00	0.11	0.50	0.11	1375.41	144.69	1303.07	9015.28	6.55
75.00	0.10	0.50	0.10	1230.72	122.41	1169.52	7712.21	6.27
76.00	0.12	0.50	0.12	1108.31	128.84	1043.89	6542.69	5.90
77.00	0.13	0.50	0.12	979.48	120.87	919.04	5498.80	5.61
78.00	0.15	0.50	0.14	858.60	122.79	797.21	4579.76	5.33
79.00	0.14	0.50	0.13	735.82	93.56	689.04	3782.55	5.14
80.00	0.14	0.50	0.13	642.26	82.49	601.02	3093.51	4.82
81.00	0.15	0.50	0.14	559.77	76.79	521.38	2492.49	4.45
82.00	0.19	0.50	0.18	482.99	85.74	440.12	1971.11	4.08
83.00	0.17	0.50	0.15	397.25	61.55	366.48	1530.99	3.85
84.00	0.25	0.50	0.23	335.70	75.57	297.92	1164.51	3.47
85.00	0.30	3.33	1.00	260.13	260.13	866.60	866.60	3.33

Table E.11 Pre-epidemic Female Lifetable: Winter Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.12	0.31	0.11	10000.00	1136.40	9215.88	503172.24	50.32
1.00	0.04	0.50	0.03	8863.60	307.90	8709.65	493956.35	55.73
2.00	0.02	0.50	0.02	8555.70	163.03	8474.18	485246.71	56.72
3.00	0.01	0.50	0.01	8392.66	97.77	8343.77	476772.53	56.81
4.00	0.01	0.50	0.01	8294.89	67.62	8261.08	468428.75	56.47
5.00	0.01	0.50	0.01	8227.27	53.64	8200.45	460167.67	55.93
6.00	0.00	0.50	0.00	8173.63	38.13	8154.57	451967.22	55.30
7.00	0.00	0.50	0.00	8135.50	32.69	8119.16	443812.65	54.55
8.00	0.00	0.50	0.00	8102.81	29.61	8088.01	435693.50	53.77
9.00	0.00	0.50	0.00	8073.20	22.38	8062.01	427605.49	52.97
10.00	0.00	0.50	0.00	8050.82	23.12	8039.26	419543.48	52.11
11.00	0.00	0.50	0.00	8027.70	22.73	8016.34	411504.21	51.26
12.00	0.00	0.50	0.00	8004.97	21.23	7994.36	403487.88	50.40
13.00	0.00	0.50	0.00	7983.74	21.82	7972.83	395493.52	49.54
14.00	0.00	0.50	0.00	7961.92	27.29	7948.27	387520.69	48.67
15.00	0.00	0.50	0.00	7934.63	28.36	7920.45	379572.42	47.84
16.00	0.00	0.50	0.00	7906.26	28.38	7892.07	371651.97	47.01
17.00	0.00	0.50	0.00	7877.88	31.66	7862.05	363759.90	46.17
18.00	0.00	0.50	0.00	7846.22	30.87	7830.79	355897.84	45.36
19.00	0.00	0.50	0.00	7815.35	37.54	7796.58	348067.05	44.54
20.00	0.00	0.50	0.00	7777.81	32.00	7761.81	340270.47	43.75
21.00	0.00	0.50	0.00	7745.81	34.55	7728.54	332508.66	42.93
22.00	0.01	0.50	0.00	7711.27	38.51	7692.01	324780.12	42.12
23.00	0.00	0.50	0.00	7672.75	33.88	7655.81	317088.11	41.33
24.00	0.01	0.50	0.01	7638.87	40.37	7618.69	309432.30	40.51
25.00	0.01	0.50	0.01	7598.50	46.26	7575.37	301813.61	39.72
26.00	0.01	0.50	0.01	7552.24	40.78	7531.85	294238.24	38.96
27.00	0.00	0.50	0.00	7511.46	34.84	7494.04	286706.38	38.17
28.00	0.01	0.50	0.01	7476.62	41.04	7456.10	279212.34	37.34
29.00	0.01	0.50	0.01	7435.58	40.41	7415.38	271756.24	36.55
30.00	0.01	0.50	0.01	7395.17	39.63	7375.36	264340.86	35.75
31.00	0.01	0.50	0.01	7355.54	50.40	7330.35	256965.50	34.93
32.00	0.01	0.50	0.01	7305.15	44.64	7282.83	249635.16	34.17
33.00	0.01	0.50	0.01	7260.51	49.43	7235.79	242352.33	33.38
34.00	0.01	0.50	0.01	7211.08	41.85	7190.15	235116.54	32.60
35.00	0.01	0.50	0.01	7169.22	53.54	7142.45	227926.39	31.79
36.00	0.01	0.50	0.01	7115.68	54.28	7088.54	220783.93	31.03
37.00	0.01	0.50	0.01	7061.40	54.31	7034.24	213695.40	30.26
38.00	0.01	0.50	0.01	7007.09	61.32	6976.43	206661.15	29.49
39.00	0.01	0.50	0.01	6945.76	66.00	6912.77	199684.73	28.75
40.00	0.01	0.50	0.01	6879.77	57.28	6851.13	192771.96	28.02
41.00	0.01	0.50	0.01	6822.49	50.69	6797.14	185920.84	27.25
42.00	0.01	0.50	0.01	6771.80	57.61	6742.99	179123.69	26.45
43.00	0.01	0.50	0.01	6714.19	58.02	6685.18	172380.70	25.67
44.00	0.01	0.50	0.01	6656.17	65.22	6623.56	165695.52	24.89
45.00	0.01	0.50	0.01	6590.95	66.82	6557.54	159071.97	24.13
46.00	0.01	0.50	0.01	6524.13	66.54	6490.86	152514.43	23.38
47.00	0.01	0.50	0.01	6457.59	69.55	6422.81	146023.57	22.61
48.00	0.01	0.50	0.01	6388.03	73.26	6351.40	139600.76	21.85
49.00	0.01	0.50	0.01	6314.77	88.90	6270.32	133249.36	21.10
50.00	0.01	0.50	0.01	6225.87	83.78	6183.98	126979.04	20.40
51.00	0.01	0.50	0.01	6142.09	88.15	6098.01	120795.06	19.67
52.00	0.02	0.50	0.02	6053.94	103.01	6002.44	114697.05	18.95
53.00	0.02	0.50	0.02	5950.93	102.49	5899.69	108694.61	18.27
54.00	0.02	0.50	0.02	5848.44	92.00	5802.44	102794.92	17.58
55.00	0.02	0.50	0.02	5756.44	113.04	5699.92	96992.48	16.85
56.00	0.02	0.50	0.02	5643.40	127.57	5579.61	91292.56	16.18
57.00	0.02	0.50	0.02	5515.83	117.10	5457.28	85712.95	15.54
58.00	0.03	0.50	0.03	5398.73	137.97	5329.74	80255.67	14.87
59.00	0.03	0.50	0.03	5260.76	137.06	5192.23	74925.92	14.24
60.00	0.03	0.50	0.03	5123.69	151.09	5048.15	69733.70	13.61
61.00	0.03	0.50	0.03	4972.61	147.39	4898.91	64685.54	13.01
62.00	0.04	0.50	0.04	4825.22	174.44	4738.00	59786.63	12.39
63.00	0.04	0.50	0.04	4650.78	166.05	4567.75	55048.64	11.84
64.00	0.04	0.50	0.04	4484.72	181.77	4393.84	50480.88	11.26
65.00	0.04	0.50	0.04	4302.96	184.65	4210.63	46087.04	10.71
66.00	0.04	0.50	0.04	4118.31	178.15	4029.23	41876.41	10.17
67.00	0.04	0.50	0.04	3940.16	170.93	3854.69	37847.18	9.61
68.00	0.05	0.50	0.05	3769.23	200.52	3668.97	33992.48	9.02
69.00	0.06	0.50	0.06	3568.71	199.68	3468.87	30323.51	8.50
70.00	0.06	0.50	0.06	3369.03	208.68	3264.69	26854.64	7.97
71.00	0.07	0.50	0.07	3160.36	212.63	3054.04	23589.95	7.46
72.00	0.09	0.50	0.08	2947.73	244.37	2825.54	20535.91	6.97
73.00	0.09	0.50	0.09	2703.35	233.35	2586.68	17710.37	6.55
74.00	0.11	0.50	0.10	2470.01	254.14	2342.94	15123.69	6.12
75.00	0.13	0.50	0.12	2215.87	267.23	2082.25	12780.75	5.77
76.00	0.14	0.50	0.13	1948.64	259.13	1819.07	10698.50	5.49
77.00	0.14	0.50	0.13	1689.51	219.77	1579.63	8879.43	5.26
78.00	0.15	0.50	0.14	1469.74	200.00	1369.74	7299.80	4.97
79.00	0.16	0.50	0.15	1269.74	186.29	1176.60	5930.06	4.67
80.00	0.19	0.50	0.17	1083.45	184.52	991.19	4753.46	4.39
81.00	0.15	0.50	0.14	898.93	127.70	835.08	3762.27	4.19
82.00	0.21	0.50	0.19	771.23	144.14	699.16	2927.19	3.80
83.00	0.22	0.50	0.20	627.09	126.71	563.73	2228.03	3.55
84.00	0.26	0.50	0.23	500.37	116.04	442.35	1664.30	3.33
85.00	0.31	3.18	1.00	384.33	384.33	1221.95	1221.95	3.18

Table E.12 Epidemic Female Lifetable: Winter Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.15	0.31	0.14	10000.00	1393.43	9038.54	425081.06	42.51
1.00	0.05	0.50	0.05	8606.57	413.86	8399.64	416042.52	48.34
2.00	0.03	0.50	0.03	8192.72	280.77	8052.33	407642.88	49.76
3.00	0.02	0.50	0.02	7911.95	158.74	7832.58	399590.55	50.50
4.00	0.01	0.50	0.01	7753.20	106.05	7700.18	391757.97	50.53
5.00	0.01	0.50	0.01	7647.16	81.01	7606.65	384057.79	50.22
6.00	0.01	0.50	0.01	7566.15	59.87	7536.21	376451.14	49.75
7.00	0.00	0.50	0.00	7506.28	28.30	7492.13	368914.93	49.15
8.00	0.00	0.50	0.00	7477.98	26.89	7464.54	361422.80	48.33
9.00	0.00	0.50	0.00	7451.09	28.78	7436.70	353958.26	47.50
10.00	0.00	0.50	0.00	7422.31	26.73	7408.95	346521.56	46.69
11.00	0.00	0.50	0.00	7395.58	21.06	7385.05	339112.61	45.85
12.00	0.00	0.50	0.00	7374.52	30.58	7359.23	331727.56	44.98
13.00	0.00	0.50	0.00	7343.93	32.32	7327.77	324368.33	44.17
14.00	0.01	0.50	0.01	7311.61	40.52	7291.35	317040.56	43.36
15.00	0.01	0.50	0.01	7271.09	37.67	7252.26	309749.21	42.60
16.00	0.01	0.50	0.01	7233.43	37.46	7214.70	302496.95	41.82
17.00	0.01	0.50	0.01	7195.97	46.20	7172.87	295282.25	41.03
18.00	0.01	0.50	0.01	7149.77	43.90	7127.82	288109.38	40.30
19.00	0.01	0.50	0.01	7105.87	45.49	7083.12	280981.57	39.54
20.00	0.01	0.50	0.01	7060.37	48.04	7036.35	273898.45	38.79
21.00	0.01	0.50	0.01	7012.33	61.07	6981.79	266862.10	38.06
22.00	0.01	0.50	0.01	6951.26	71.01	6915.75	259880.31	37.39
23.00	0.01	0.50	0.01	6880.25	54.51	6852.99	252964.56	36.77
24.00	0.01	0.50	0.01	6825.74	71.14	6790.17	246111.56	36.06
25.00	0.01	0.50	0.01	6754.60	70.05	6719.57	239321.40	35.43
26.00	0.01	0.50	0.01	6684.55	87.95	6640.57	232601.83	34.80
27.00	0.01	0.50	0.01	6596.59	83.95	6554.62	225961.26	34.25
28.00	0.01	0.50	0.01	6512.64	83.28	6471.00	219406.64	33.69
29.00	0.01	0.50	0.01	6429.36	73.43	6392.64	212935.64	33.12
30.00	0.01	0.50	0.01	6355.93	80.66	6315.60	206543.00	32.50
31.00	0.01	0.50	0.01	6275.27	76.03	6237.26	200227.40	31.91
32.00	0.01	0.50	0.01	6199.24	73.33	6162.58	193990.15	31.29
33.00	0.01	0.50	0.01	6125.91	80.89	6085.46	187827.57	30.66
34.00	0.01	0.50	0.01	6045.01	77.32	6006.35	181742.11	30.06
35.00	0.01	0.50	0.01	5967.69	58.42	5938.48	175735.75	29.45
36.00	0.01	0.50	0.01	5909.27	58.69	5879.93	169797.27	28.73
37.00	0.01	0.50	0.01	5850.58	44.70	5828.23	163917.34	28.02
38.00	0.01	0.50	0.01	5805.88	60.18	5775.79	158089.11	27.23
39.00	0.01	0.50	0.01	5745.70	59.22	5716.09	152313.32	26.51
40.00	0.01	0.50	0.01	5686.48	60.86	5656.05	146597.22	25.78
41.00	0.01	0.50	0.01	5625.61	59.08	5596.08	140941.18	25.05
42.00	0.01	0.50	0.01	5566.54	64.56	5534.26	135345.10	24.31
43.00	0.01	0.50	0.01	5501.98	54.95	5474.51	129810.84	23.59
44.00	0.01	0.50	0.01	5447.03	69.03	5412.52	124336.34	22.83
45.00	0.01	0.50	0.01	5378.00	68.62	5343.69	118923.82	22.11
46.00	0.01	0.50	0.01	5309.38	76.00	5271.38	113580.13	21.39
47.00	0.01	0.50	0.01	5233.38	73.92	5196.42	108308.75	20.70
48.00	0.01	0.50	0.01	5159.46	76.09	5121.41	103112.33	19.99
49.00	0.02	0.50	0.02	5083.36	93.92	5036.40	97990.92	19.28
50.00	0.02	0.50	0.02	4989.44	101.42	4938.73	92954.52	18.63
51.00	0.02	0.50	0.02	4888.02	89.18	4843.43	88015.79	18.01
52.00	0.02	0.50	0.02	4798.84	90.98	4753.35	83172.36	17.33
53.00	0.02	0.50	0.02	4707.86	115.93	4649.90	78419.00	16.66
54.00	0.03	0.50	0.02	4591.94	113.86	4535.01	73769.10	16.06
55.00	0.02	0.50	0.02	4478.08	105.05	4425.56	69234.09	15.46
56.00	0.03	0.50	0.03	4373.04	121.95	4312.06	64808.53	14.82
57.00	0.03	0.50	0.03	4251.08	114.60	4193.78	60496.47	14.23
58.00	0.03	0.50	0.03	4136.48	137.25	4067.86	56302.69	13.61
59.00	0.03	0.50	0.03	3999.23	115.12	3941.67	52234.84	13.06
60.00	0.03	0.50	0.03	3884.11	108.99	3829.62	48293.16	12.43
61.00	0.04	0.50	0.04	3775.13	140.36	3704.95	44463.54	11.78
62.00	0.04	0.50	0.04	3634.76	153.56	3557.99	40758.60	11.21
63.00	0.04	0.50	0.04	3481.21	147.98	3407.21	37200.61	10.69
64.00	0.05	0.50	0.05	3333.22	161.30	3252.57	33793.40	10.14
65.00	0.06	0.50	0.05	3171.92	174.19	3084.82	30540.83	9.63
66.00	0.06	0.50	0.05	2997.73	164.25	2915.60	27456.01	9.16
67.00	0.06	0.50	0.06	2833.47	164.07	2751.44	24540.41	8.66
68.00	0.06	0.50	0.06	2669.40	165.31	2586.75	21788.97	8.16
69.00	0.07	0.50	0.07	2504.09	171.30	2418.44	19202.22	7.67
70.00	0.10	0.50	0.09	2332.79	212.64	2226.47	16783.78	7.19
71.00	0.08	0.50	0.07	2120.15	154.76	2042.77	14557.32	6.87
72.00	0.11	0.50	0.10	1965.39	201.71	1864.54	12514.55	6.37
73.00	0.10	0.50	0.10	1763.68	168.41	1679.48	10650.01	6.04
74.00	0.12	0.50	0.12	1595.27	184.82	1502.86	8970.53	5.62
75.00	0.14	0.50	0.13	1410.46	179.33	1320.79	7467.67	5.29
76.00	0.18	0.50	0.16	1231.13	198.19	1132.03	6146.88	4.99
77.00	0.16	0.50	0.15	1032.94	153.04	956.41	5014.84	4.85
78.00	0.18	0.50	0.16	879.89	144.06	807.86	4058.43	4.61
79.00	0.15	0.50	0.14	735.83	105.41	683.12	3250.57	4.42
80.00	0.19	0.50	0.18	630.42	110.49	575.17	2567.45	4.07
81.00	0.18	0.50	0.17	519.93	86.71	476.57	1992.27	3.83
82.00	0.22	0.50	0.20	433.22	85.70	390.37	1515.70	3.50
83.00	0.22	0.50	0.20	347.52	70.22	312.41	1125.33	3.24
84.00	0.31	0.50	0.27	277.31	74.58	240.02	812.92	2.93
85.00	0.35	2.83	1.00	202.73	202.73	572.90	572.90	2.83

Table E.13 Pre-epidemic Male Lifetable: Winter Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.15	0.30	0.14	10000.00	1385.67	9030.03	466734.71	46.67
1.00	0.04	0.50	0.04	8614.33	340.85	8443.91	457704.68	53.13
2.00	0.02	0.50	0.02	8273.49	196.07	8175.45	449260.77	54.30
3.00	0.01	0.50	0.01	8077.41	95.63	8029.60	441085.32	54.61
4.00	0.01	0.50	0.01	7981.78	62.52	7950.52	433055.72	54.26
5.00	0.01	0.50	0.01	7919.26	45.87	7896.32	425105.20	53.68
6.00	0.00	0.50	0.00	7873.39	37.15	7854.81	417208.88	52.99
7.00	0.00	0.50	0.00	7836.24	27.18	7822.65	409354.07	52.24
8.00	0.00	0.50	0.00	7809.06	26.43	7795.85	401531.42	51.42
9.00	0.00	0.50	0.00	7782.63	22.68	7771.29	393735.58	50.59
10.00	0.00	0.50	0.00	7759.95	16.37	7751.76	385964.29	49.74
11.00	0.00	0.50	0.00	7743.58	19.54	7733.80	378212.52	48.84
12.00	0.00	0.50	0.00	7724.03	18.15	7714.96	370478.72	47.96
13.00	0.00	0.50	0.00	7705.88	19.35	7696.20	362763.77	47.08
14.00	0.00	0.50	0.00	7686.53	20.13	7676.47	355067.56	46.19
15.00	0.00	0.50	0.00	7666.40	21.61	7655.60	347391.09	45.31
16.00	0.00	0.50	0.00	7644.79	31.64	7628.97	339735.50	44.44
17.00	0.00	0.50	0.00	7613.15	32.23	7597.04	332106.52	43.62
18.00	0.01	0.50	0.01	7580.93	43.56	7559.15	324509.48	42.81
19.00	0.01	0.50	0.01	7537.36	40.68	7517.02	316950.34	42.05
20.00	0.01	0.50	0.01	7496.68	42.39	7475.49	309433.32	41.28
21.00	0.01	0.50	0.01	7454.30	41.25	7433.67	301957.83	40.51
22.00	0.01	0.50	0.01	7413.05	37.55	7394.27	294524.16	39.73
23.00	0.01	0.50	0.01	7375.50	37.99	7356.50	287129.88	38.93
24.00	0.01	0.50	0.01	7337.51	43.82	7315.60	279773.38	38.13
25.00	0.01	0.50	0.01	7293.69	41.27	7273.06	272457.78	37.36
26.00	0.01	0.50	0.01	7252.42	45.34	7229.75	265184.73	36.56
27.00	0.01	0.50	0.01	7207.08	39.12	7187.52	257954.98	35.79
28.00	0.01	0.50	0.01	7167.95	38.34	7148.79	250767.46	34.98
29.00	0.01	0.50	0.01	7129.62	48.21	7105.51	243618.68	34.17
30.00	0.01	0.50	0.01	7081.40	39.33	7061.74	236513.17	33.40
31.00	0.01	0.50	0.01	7042.08	48.70	7017.73	229451.42	32.58
32.00	0.01	0.50	0.01	6993.38	47.56	6969.59	222433.70	31.81
33.00	0.01	0.50	0.01	6945.81	46.41	6922.61	215464.10	31.02
34.00	0.01	0.50	0.01	6899.41	50.15	6874.33	208541.49	30.23
35.00	0.01	0.50	0.01	6849.26	46.49	6826.01	201667.16	29.44
36.00	0.01	0.50	0.01	6802.77	64.50	6770.52	194841.15	28.64
37.00	0.01	0.50	0.01	6738.28	43.57	6716.49	188070.62	27.91
38.00	0.01	0.50	0.01	6694.71	53.28	6668.07	181354.13	27.09
39.00	0.01	0.50	0.01	6641.43	55.36	6613.75	174686.07	26.30
40.00	0.01	0.50	0.01	6586.06	62.27	6554.93	168072.32	25.52
41.00	0.01	0.50	0.01	6523.80	63.69	6491.96	161517.39	24.76
42.00	0.01	0.50	0.01	6460.11	65.59	6427.32	155025.43	24.00
43.00	0.01	0.50	0.01	6394.52	70.54	6359.25	148598.11	23.24
44.00	0.01	0.50	0.01	6323.98	79.10	6284.43	142238.86	22.49
45.00	0.01	0.50	0.01	6244.88	78.00	6205.88	135954.43	21.77
46.00	0.01	0.50	0.01	6166.88	84.15	6124.81	129748.55	21.04
47.00	0.01	0.50	0.01	6082.73	75.94	6044.76	123623.74	20.32
48.00	0.02	0.50	0.02	6006.79	90.84	5961.37	117578.98	19.57
49.00	0.02	0.50	0.02	5915.95	99.03	5866.44	111617.61	18.87
50.00	0.02	0.50	0.02	5816.93	108.48	5762.69	105751.17	18.18
51.00	0.02	0.50	0.02	5708.45	99.69	5658.61	99988.48	17.52
52.00	0.02	0.50	0.02	5608.76	119.53	5549.00	94329.87	16.82
53.00	0.02	0.50	0.02	5489.24	114.45	5432.01	88780.87	16.17
54.00	0.03	0.50	0.02	5374.79	134.01	5307.79	83348.85	15.51
55.00	0.03	0.50	0.03	5240.78	139.82	5170.88	78041.07	14.89
56.00	0.03	0.50	0.03	5100.97	140.19	5030.87	72870.19	14.29
57.00	0.03	0.50	0.03	4960.78	142.13	4889.71	67839.32	13.68
58.00	0.03	0.50	0.03	4818.65	155.29	4741.01	62949.60	13.06
59.00	0.03	0.50	0.03	4663.36	141.91	4592.41	58208.59	12.48
60.00	0.04	0.50	0.04	4521.46	174.43	4434.24	53616.18	11.86
61.00	0.04	0.50	0.04	4347.03	160.53	4266.77	49181.94	11.31
62.00	0.05	0.50	0.05	4186.50	192.32	4090.34	44915.17	10.73
63.00	0.05	0.50	0.05	3994.18	190.51	3898.92	40824.83	10.22
64.00	0.05	0.50	0.05	3803.67	191.37	3707.98	36925.91	9.71
65.00	0.06	0.50	0.06	3612.30	206.88	3508.86	33217.93	9.20
66.00	0.06	0.50	0.06	3405.42	209.78	3300.53	29709.07	8.72
67.00	0.07	0.50	0.07	3195.64	212.54	3089.37	26408.55	8.26
68.00	0.07	0.50	0.07	2983.10	194.97	2885.62	23319.18	7.82
69.00	0.08	0.50	0.07	2788.13	208.46	2683.90	20433.56	7.33
70.00	0.08	0.50	0.08	2579.67	202.12	2478.61	17749.66	6.88
71.00	0.09	0.50	0.08	2377.55	199.92	2277.59	15271.05	6.42
72.00	0.12	0.50	0.11	2177.63	238.91	2058.18	12993.46	5.97
73.00	0.13	0.50	0.12	1938.72	233.96	1821.74	10935.28	5.64
74.00	0.14	0.50	0.13	1704.77	229.91	1589.81	9113.54	5.35
75.00	0.16	0.50	0.15	1474.85	217.59	1366.06	7523.73	5.10
76.00	0.16	0.50	0.15	1257.26	189.42	1162.55	6157.67	4.90
77.00	0.16	0.50	0.14	1067.84	154.82	990.43	4995.12	4.68
78.00	0.18	0.50	0.16	913.02	150.52	837.76	4004.69	4.39
79.00	0.17	0.50	0.16	762.50	121.60	701.70	3166.92	4.15
80.00	0.20	0.50	0.19	640.90	118.61	581.60	2465.22	3.85
81.00	0.19	0.50	0.17	522.30	90.07	477.26	1883.62	3.61
82.00	0.26	0.50	0.23	432.23	100.77	381.84	1406.36	3.25
83.00	0.26	0.50	0.23	331.46	76.11	293.40	1024.52	3.09
84.00	0.32	0.50	0.28	255.35	70.25	220.22	731.11	2.86
85.00	0.36	2.76	1.00	185.10	185.10	510.89	510.89	2.76

Table E.14 Epidemic Male Lifetable: Winter Wave

Age	nmx	nax	nqx	lx	ndx	nLx	Tx	ex
0.00	0.20	0.30	0.18	10000.00	1778.52	8755.03	394132.99	39.41
1.00	0.05	0.50	0.05	8221.48	427.25	8007.85	385377.96	46.87
2.00	0.03	0.50	0.03	7794.23	247.58	7670.44	377370.11	48.42
3.00	0.02	0.50	0.02	7546.65	136.40	7478.45	369699.67	48.99
4.00	0.01	0.50	0.01	7410.25	90.17	7365.16	362221.23	48.88
5.00	0.01	0.50	0.01	7320.08	74.93	7282.61	354856.06	48.48
6.00	0.01	0.50	0.01	7245.14	48.39	7220.95	347573.45	47.97
7.00	0.00	0.50	0.00	7196.76	34.23	7179.64	340352.50	47.29
8.00	0.00	0.50	0.00	7162.52	28.69	7148.18	333172.86	46.52
9.00	0.00	0.50	0.00	7133.83	23.88	7121.89	326024.68	45.70
10.00	0.00	0.50	0.00	7109.95	25.34	7097.28	318902.79	44.85
11.00	0.00	0.50	0.00	7084.61	20.42	7074.40	311805.51	44.01
12.00	0.00	0.50	0.00	7064.19	21.98	7053.20	304731.10	43.14
13.00	0.00	0.50	0.00	7042.21	18.01	7033.20	297677.91	42.27
14.00	0.00	0.50	0.00	7024.19	19.71	7014.34	290644.71	41.38
15.00	0.01	0.50	0.01	7004.48	36.90	6986.03	283630.37	40.49
16.00	0.00	0.50	0.00	6967.58	34.49	6950.34	276644.33	39.70
17.00	0.01	0.50	0.01	6933.10	42.91	6911.64	269693.99	38.90
18.00	0.01	0.50	0.01	6890.18	49.79	6865.29	262782.35	38.14
19.00	0.01	0.50	0.01	6840.39	55.42	6812.68	255917.07	37.41
20.00	0.01	0.50	0.01	6784.97	58.78	6755.58	249104.38	36.71
21.00	0.01	0.50	0.01	6726.19	48.03	6702.18	242348.80	36.03
22.00	0.01	0.50	0.01	6678.17	64.74	6645.79	235646.62	35.29
23.00	0.01	0.50	0.01	6613.42	65.66	6580.59	229000.82	34.63
24.00	0.01	0.50	0.01	6547.76	67.65	6513.94	222420.23	33.97
25.00	0.01	0.50	0.01	6480.11	75.00	6442.61	215906.30	33.32
26.00	0.01	0.50	0.01	6405.12	86.00	6362.12	209463.68	32.70
27.00	0.02	0.50	0.02	6319.12	96.63	6270.80	203101.56	32.14
28.00	0.02	0.50	0.02	6222.49	103.44	6170.77	196830.76	31.63
29.00	0.02	0.50	0.02	6119.04	100.38	6068.85	190660.00	31.16
30.00	0.01	0.50	0.01	6018.66	82.99	5977.17	184591.14	30.67
31.00	0.01	0.50	0.01	5935.67	80.27	5895.54	178613.98	30.09
32.00	0.02	0.50	0.02	5855.40	94.63	5808.09	172718.44	29.50
33.00	0.01	0.50	0.01	5760.77	76.73	5722.41	166910.36	28.97
34.00	0.01	0.50	0.01	5684.05	77.36	5645.37	161187.94	28.36
35.00	0.01	0.50	0.01	5606.68	67.57	5572.90	155542.58	27.74
36.00	0.01	0.50	0.01	5539.11	65.47	5506.38	149969.68	27.07
37.00	0.01	0.50	0.01	5473.64	70.64	5438.32	144463.30	26.39
38.00	0.01	0.50	0.01	5403.00	69.59	5368.20	139024.98	25.73
39.00	0.01	0.50	0.01	5333.40	64.55	5301.13	133656.78	25.06
40.00	0.01	0.50	0.01	5268.85	61.51	5238.10	128355.65	24.36
41.00	0.01	0.50	0.01	5207.35	58.61	5178.04	123117.55	23.64
42.00	0.01	0.50	0.01	5148.74	69.65	5113.91	117939.51	22.91
43.00	0.01	0.50	0.01	5079.09	65.65	5046.26	112825.60	22.21
44.00	0.01	0.50	0.01	5013.43	63.75	4981.56	107779.34	21.50
45.00	0.01	0.50	0.01	4949.68	67.73	4915.81	102797.79	20.77
46.00	0.01	0.50	0.01	4881.95	71.64	4846.13	97881.97	20.05
47.00	0.02	0.50	0.02	4810.31	78.57	4771.02	93035.84	19.34
48.00	0.02	0.50	0.02	4731.74	87.90	4687.79	88264.82	18.65
49.00	0.02	0.50	0.02	4643.84	94.46	4596.61	83577.03	18.00
50.00	0.02	0.50	0.02	4549.38	87.27	4505.74	78980.42	17.36
51.00	0.02	0.50	0.02	4462.11	86.81	4418.70	74474.68	16.69
52.00	0.02	0.50	0.02	4375.29	99.02	4325.78	70055.98	16.01
53.00	0.02	0.50	0.02	4276.28	103.17	4224.69	65730.20	15.37
54.00	0.03	0.50	0.03	4173.11	120.76	4112.73	61505.50	14.74
55.00	0.03	0.50	0.03	4052.35	116.23	3994.23	57392.78	14.16
56.00	0.03	0.50	0.03	3936.12	117.71	3877.27	53398.54	13.57
57.00	0.03	0.50	0.03	3818.41	116.05	3760.39	49521.28	12.97
58.00	0.04	0.50	0.04	3702.37	137.89	3633.42	45760.89	12.36
59.00	0.04	0.50	0.04	3564.47	138.59	3495.18	42127.47	11.82
60.00	0.04	0.50	0.04	3425.88	138.78	3356.49	38632.29	11.28
61.00	0.04	0.50	0.04	3287.10	129.18	3222.51	35275.80	10.73
62.00	0.05	0.50	0.05	3157.92	160.94	3077.45	32053.29	10.15
63.00	0.06	0.50	0.05	2996.99	163.59	2915.19	28975.83	9.67
64.00	0.06	0.50	0.06	2833.39	167.67	2749.56	26060.64	9.20
65.00	0.07	0.50	0.06	2665.72	169.38	2581.03	23311.09	8.74
66.00	0.07	0.50	0.07	2496.34	170.91	2410.88	20730.06	8.30
67.00	0.06	0.50	0.06	2325.43	146.39	2252.23	18319.17	7.88
68.00	0.09	0.50	0.08	2179.04	181.48	2088.30	16066.94	7.37
69.00	0.10	0.50	0.10	1997.56	194.47	1900.32	13978.65	7.00
70.00	0.10	0.50	0.10	1803.09	178.99	1713.60	12078.32	6.70
71.00	0.08	0.50	0.08	1624.10	126.67	1560.76	10364.73	6.38
72.00	0.11	0.50	0.11	1497.43	161.04	1416.90	8803.96	5.88
73.00	0.12	0.50	0.11	1336.38	152.35	1260.21	7387.06	5.53
74.00	0.14	0.50	0.13	1184.03	151.02	1108.52	6126.85	5.17
75.00	0.16	0.50	0.15	1033.01	152.19	956.92	5018.33	4.86
76.00	0.17	0.50	0.16	880.82	138.26	811.69	4061.41	4.61
77.00	0.17	0.50	0.16	742.56	115.83	684.65	3249.72	4.38
78.00	0.19	0.50	0.17	626.73	109.04	572.21	2565.07	4.09
79.00	0.20	0.50	0.18	517.69	92.85	471.26	1992.86	3.85
80.00	0.21	0.50	0.19	424.84	81.31	384.18	1521.59	3.58
81.00	0.24	0.50	0.21	343.52	72.54	307.25	1137.41	3.31
82.00	0.28	0.50	0.24	270.98	65.67	238.15	830.16	3.06
83.00	0.24	0.50	0.22	205.31	44.75	182.94	592.02	2.88
84.00	0.33	0.50	0.29	160.56	45.97	137.58	409.08	2.55
85.00	0.42	2.37	1.00	114.59	114.59	271.50	271.50	2.37