

Exploratory

Popsiz data

'summarise()' has grouped output by 'date', 'agec'. You can override using the
'.groups' argument.

```
##
## J13 A403 J440 G001 A419 C349 J100 U071 J189 F03 J110 N390 I500 K703 B201 K746
## 2010 840 469 250 152 120 120 120 73 71 70 65 60 58 55 51
## I64 N179 I48 G309 I251 C900 I219 I38 E149 C509 C911 N288 J439 B348 A491 C189
## 49 46 44 41 38 33 31 30 28 27 24 24 23 22 21 21
## C259 B182 B207 E119 J690 J80 C920 N185 N19 J154 J449 C80 C859 F102 I250 I259
## 20 19 19 19 19 19 18 17 17 16 16 15 15 15 15 15
## I429 I509 J441 M069 A047 A499 B227 E112 J101 D65 F101 G002 G20 G931 I10 I330
## 15 15 15 15 14 14 14 14 14 13 13 13 13 13 13 13
## C159 E872 E889 J841 J961 I639 I694 C61 D899 E142 E43 I255 I634 J09 J159 M009
## 12 12 12 12 12 11 11 10 10 10 10 10 10 10 10 10
## N189 D619 E46 G934 H669 I350 J869 K819 W80 C679 C719 C910 I739 J459 J849 K922
## 10 9 9 9 9 9 9 9 9 8 8 8 8 8 8 8
## Q890 Q909 X44 C220
## 8 8 8 7
```

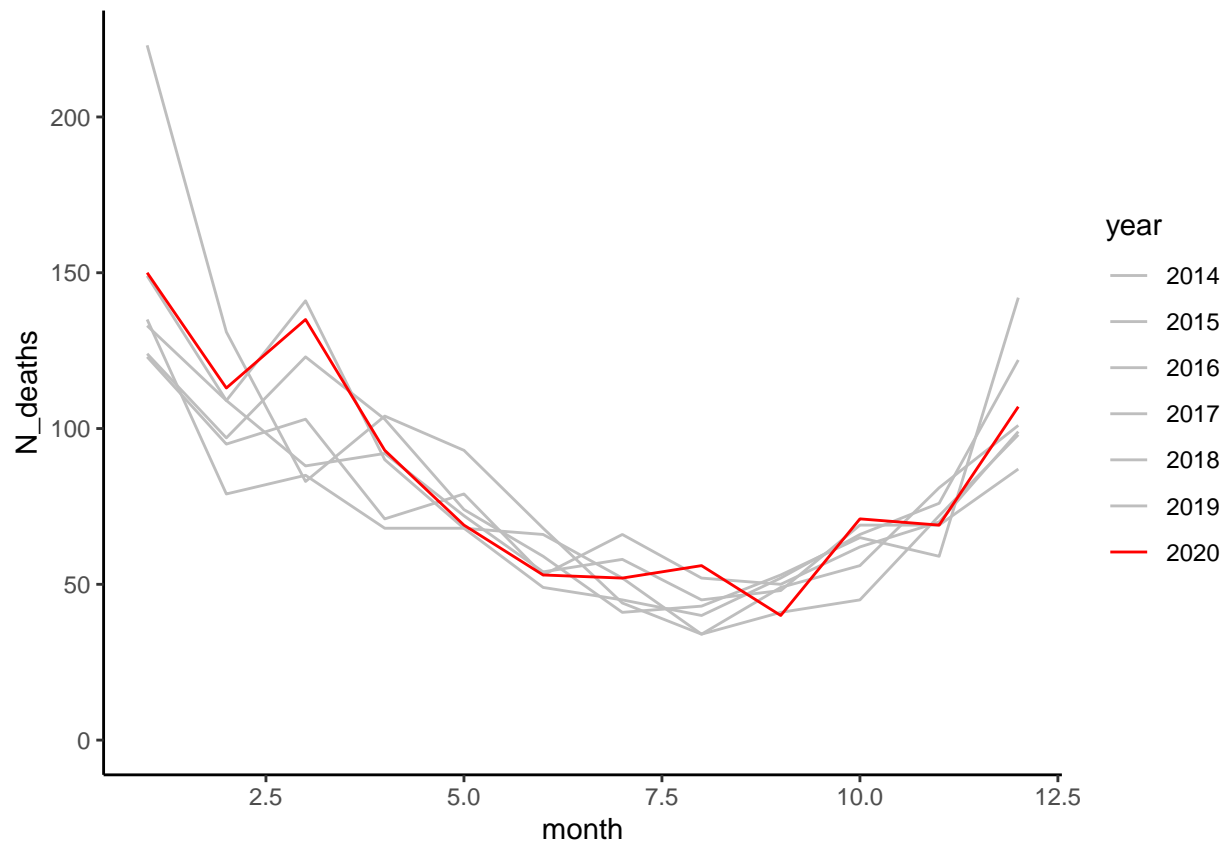
```
##
## Under 5 Years 5-24 years 25-44 years 45-64 years 65-74 years 75-84 years
## A403 38 0 65 216 155 164
## G001 35 0 37 87 38 26
## J13 16 0 122 651 336 405
##
## 85 years and older
## A403 183
## G001 18
## J13 469
```

```
##
## White Black Hispanic American Indian Asian/Pacific Islanders
## A403 617 124 63 15 21
## G001 141 64 37 6 2
## J13 1488 234 188 59 41
```

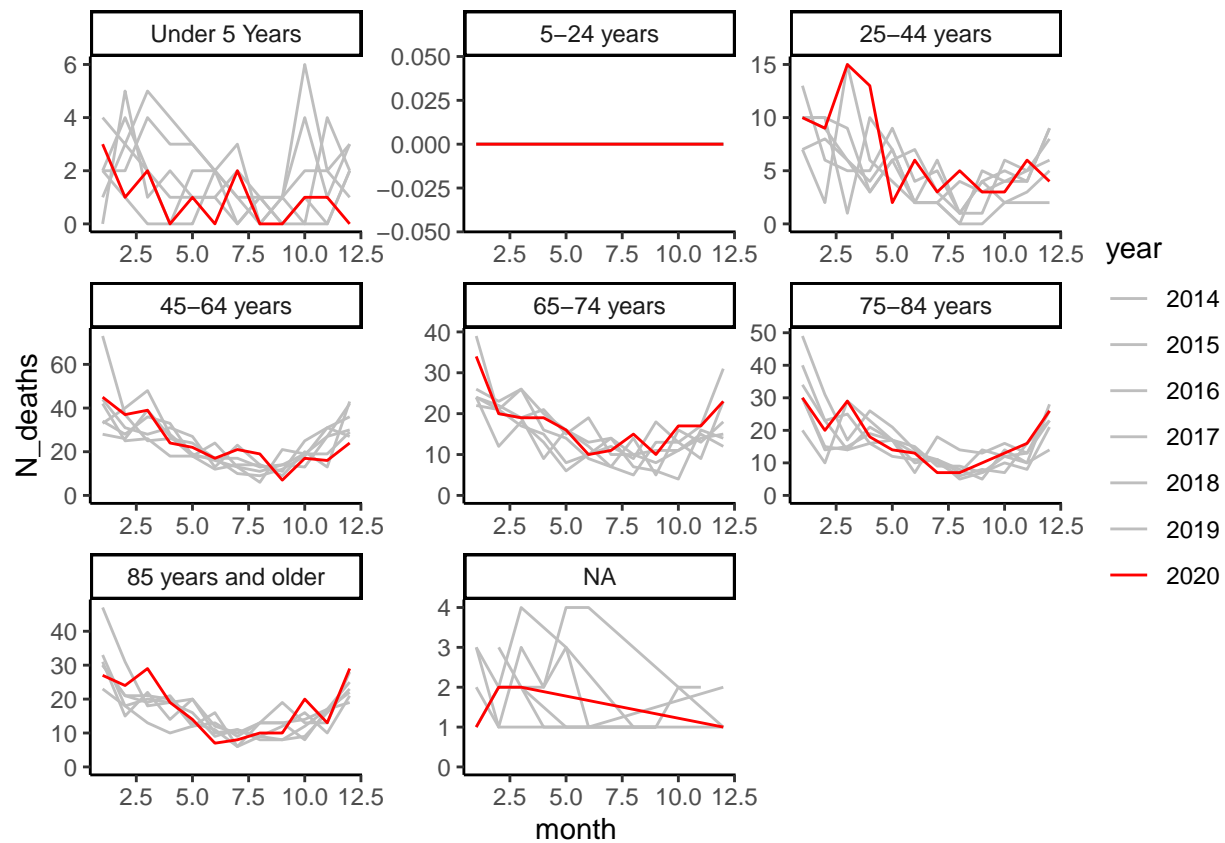
```
##
## A403 J13 A419 J960 J969 I469 R688 G001 J80 G931 R092 I500 R090 J449 C349 R068
## 1219 1216 977 549 493 480 217 210 136 73 68 47 37 36 34 32
## J189 U071 I64 R570 N179 R579 A415 A409 J154 I219 A491 G935 G936 I499 J690 G934
## 30 29 28 27 26 26 23 21 21 20 19 17 16 16 15 14
## I509 N19 R628 G002 G309 I269 R064 E872 F03 I458 I639 I678 J101 C189 G039 I461
```

```
##      14      13      12      11      11      11      11      10      9      9      9      9      9      8      8      7
## I959 N185 R060 R578 C259 I519 J110 J869 K729 K922 N288 N390 C509 E889 I38 I490
##      7      7      7      7      6      6      6      6      6      6      6      6      5      5      5      5
## I619 I629 J111 J152 J159 J961 K746 K767 T436 C80 D65 G009 G049 J181 J984 J988
##      5      5      5      5      5      5      5      5      5      4      4      4      4      4      4      4
## A391 A499 B24 C221 C229 C920 E141 E43 G419 G938 I259 I330 I472 I634 J100 J180
##      3      3      3      3      3      3      3      3      3      3      3      3      3      3      3      3
## K559 R048 R402 R58
##      3      3      3      3
```

```
## 'summarise()' has grouped output by 'year'. You can override using the '.groups'
## argument.
```

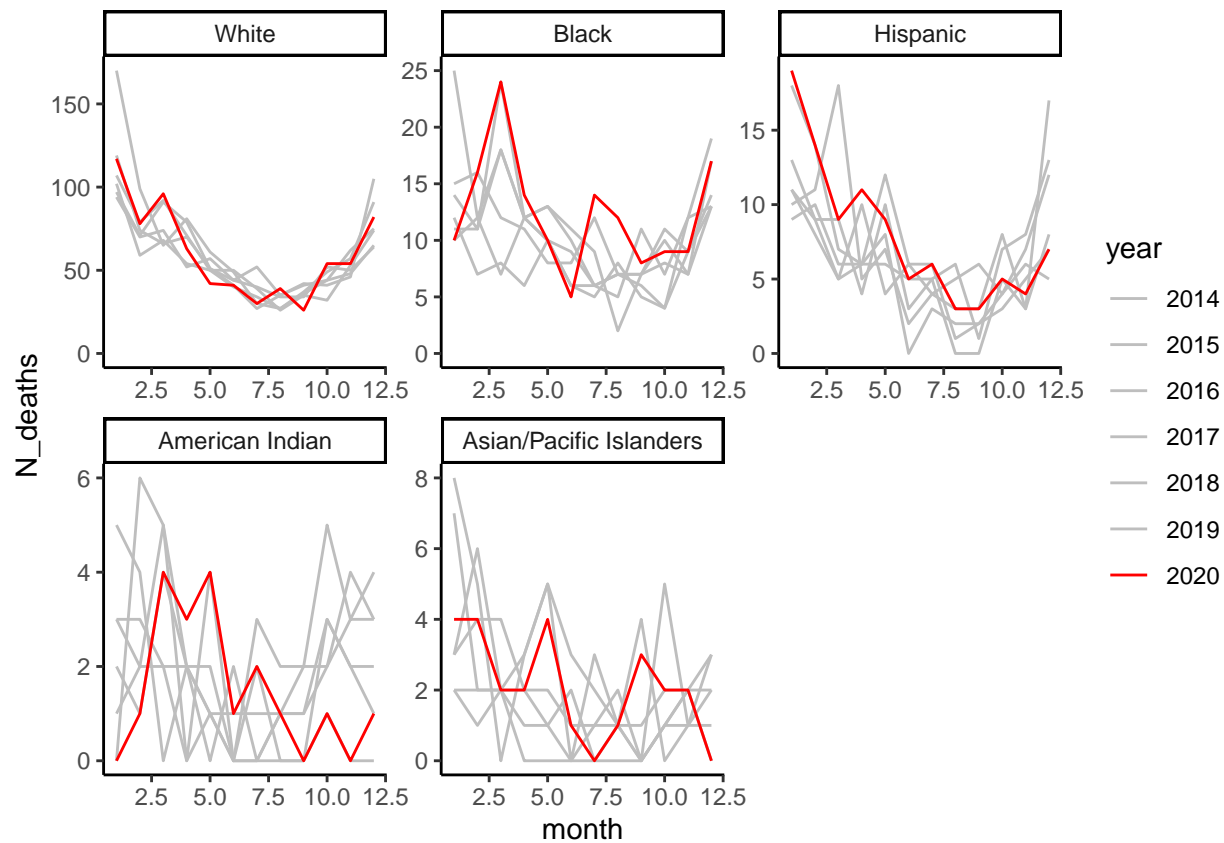


```
## 'summarise()' has grouped output by 'year', 'month'. You can override using the
## '.groups' argument.
```



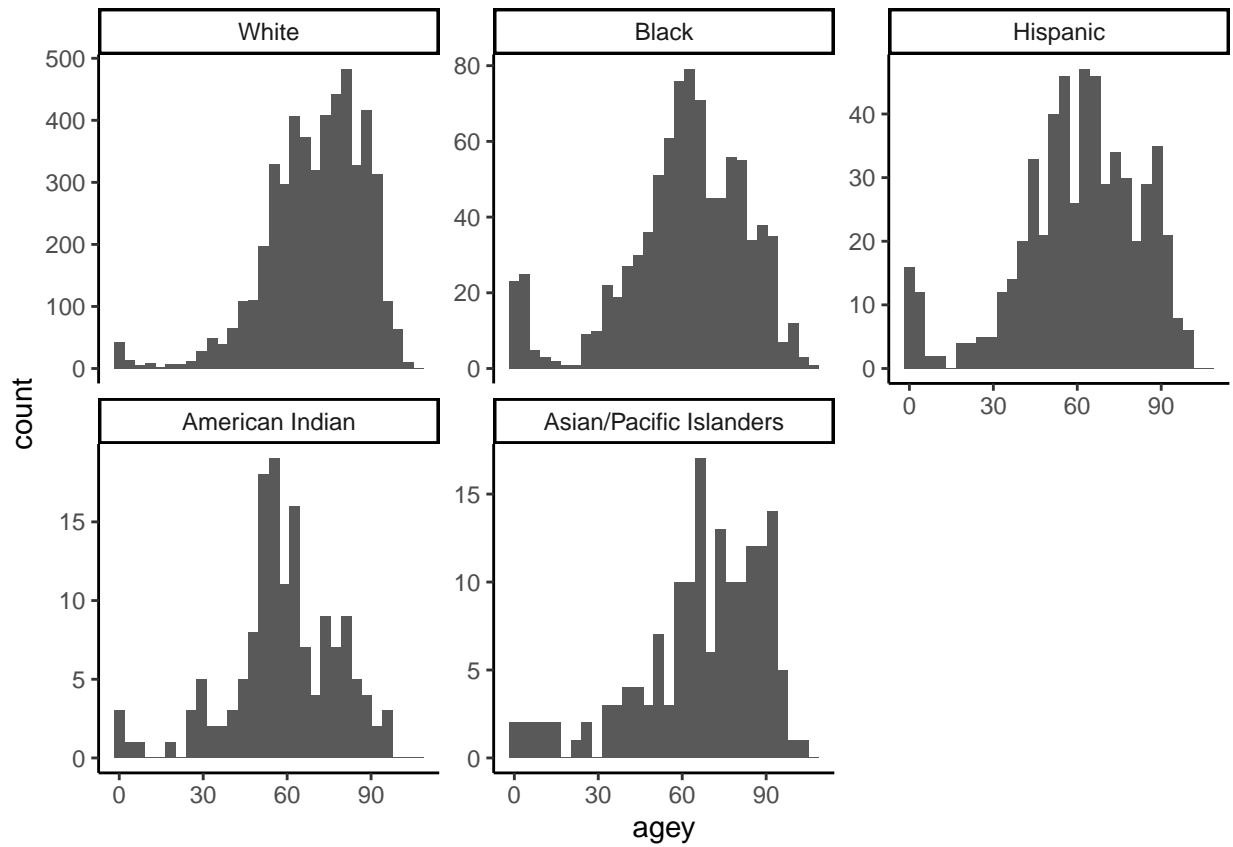
Note; big differences in age distribution. Hispanic skews much younger

```
## 'summarise()' has grouped output by 'year', 'month'. You can override using the
## '.groups' argument.
```

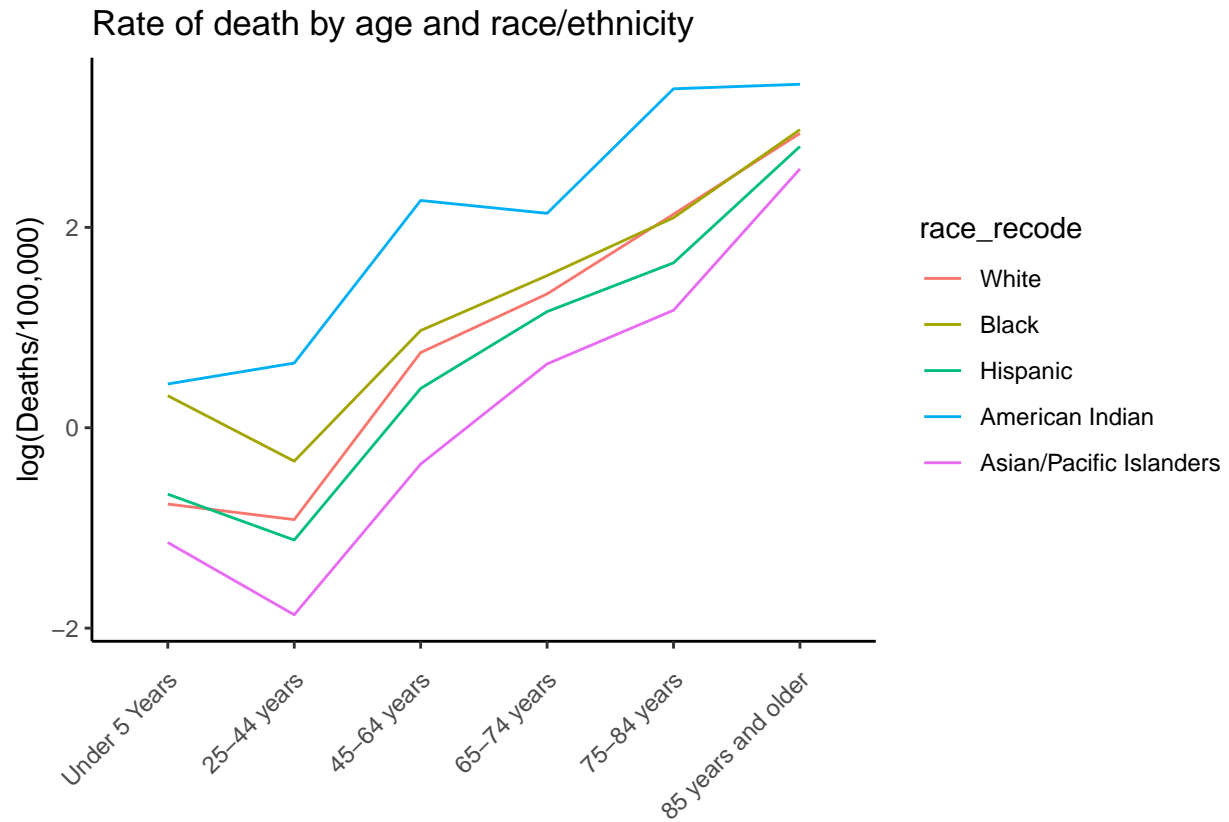


Age of deaths, by race/ethnicity. The proportion of deaths among kids is much higher for Black and Hispanic populations. need to look at incidence by age

```
## 'summarise()' has grouped output by 'year', 'month', 'race_recode'. You can override using the '.groups = NULL' argument.
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
```

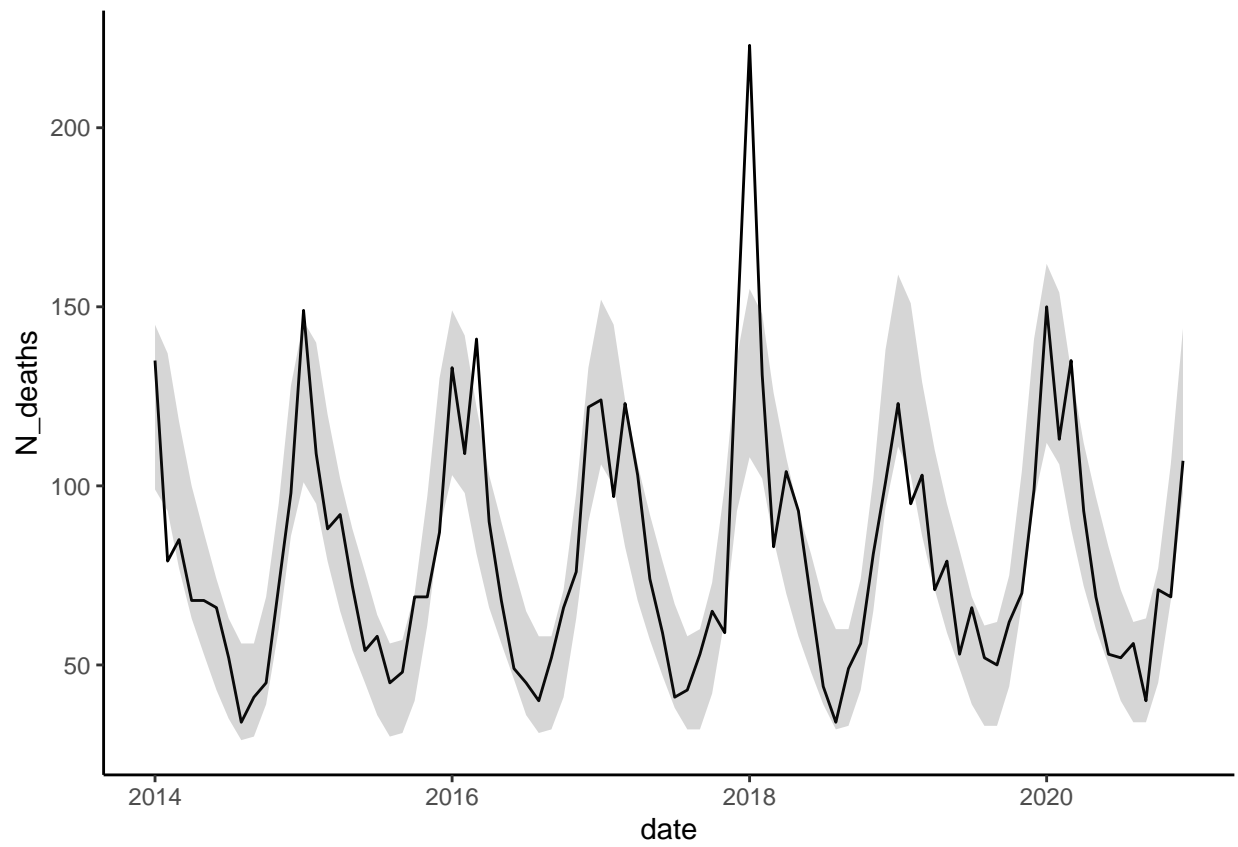


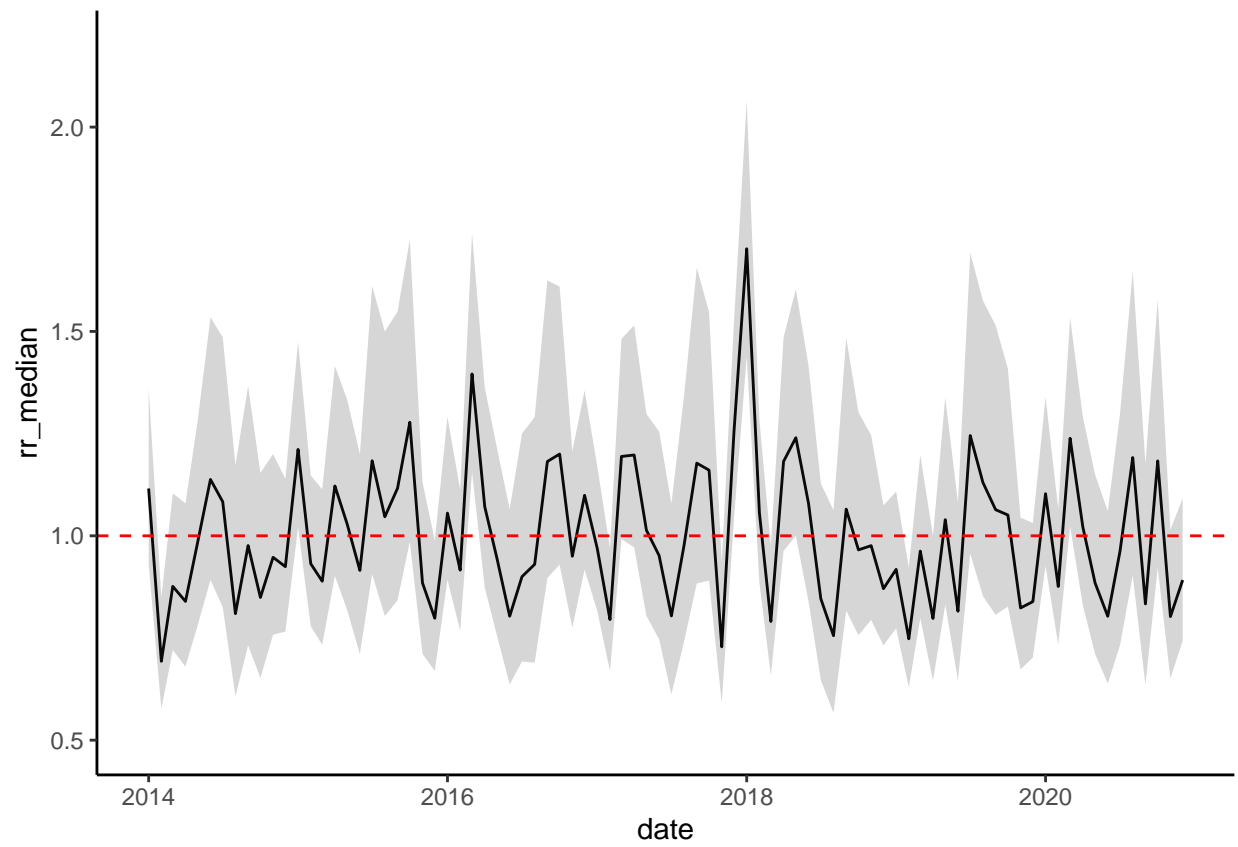
```
## 'summarise()' has grouped output by 'year', 'month', 'race_recode'. You can override using the '.groups' argument.
## 'summarise()' has grouped output by 'race_recode'. You can override using the '.groups' argument.
```

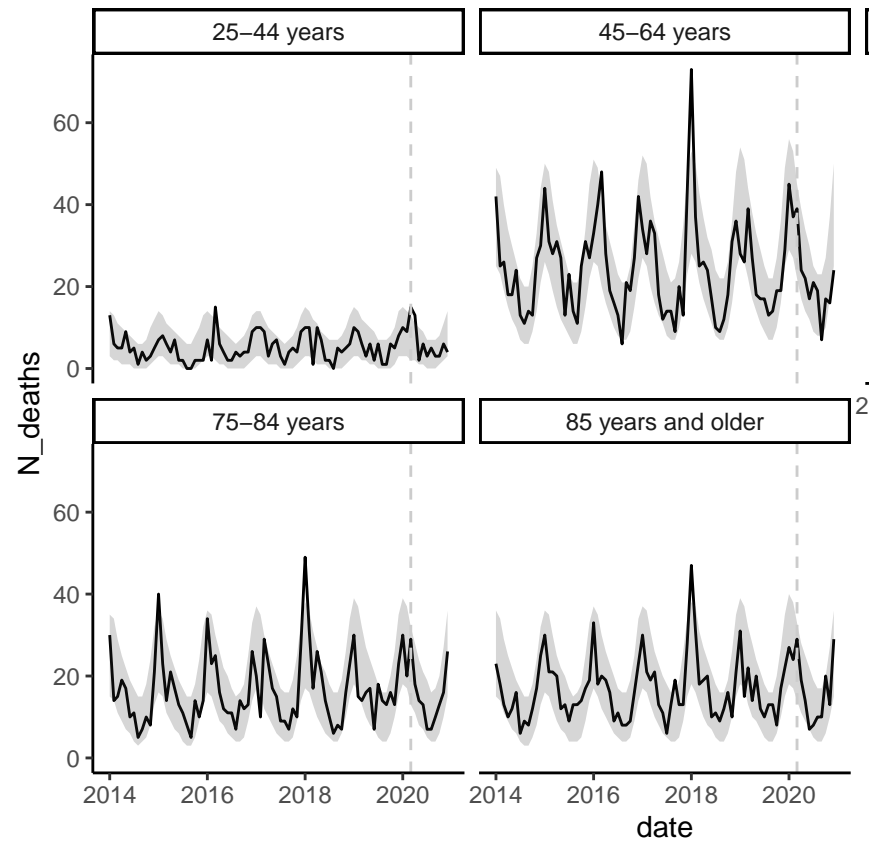


Question 1: Did the rate of death due to pneumococcus change during the pandemic?

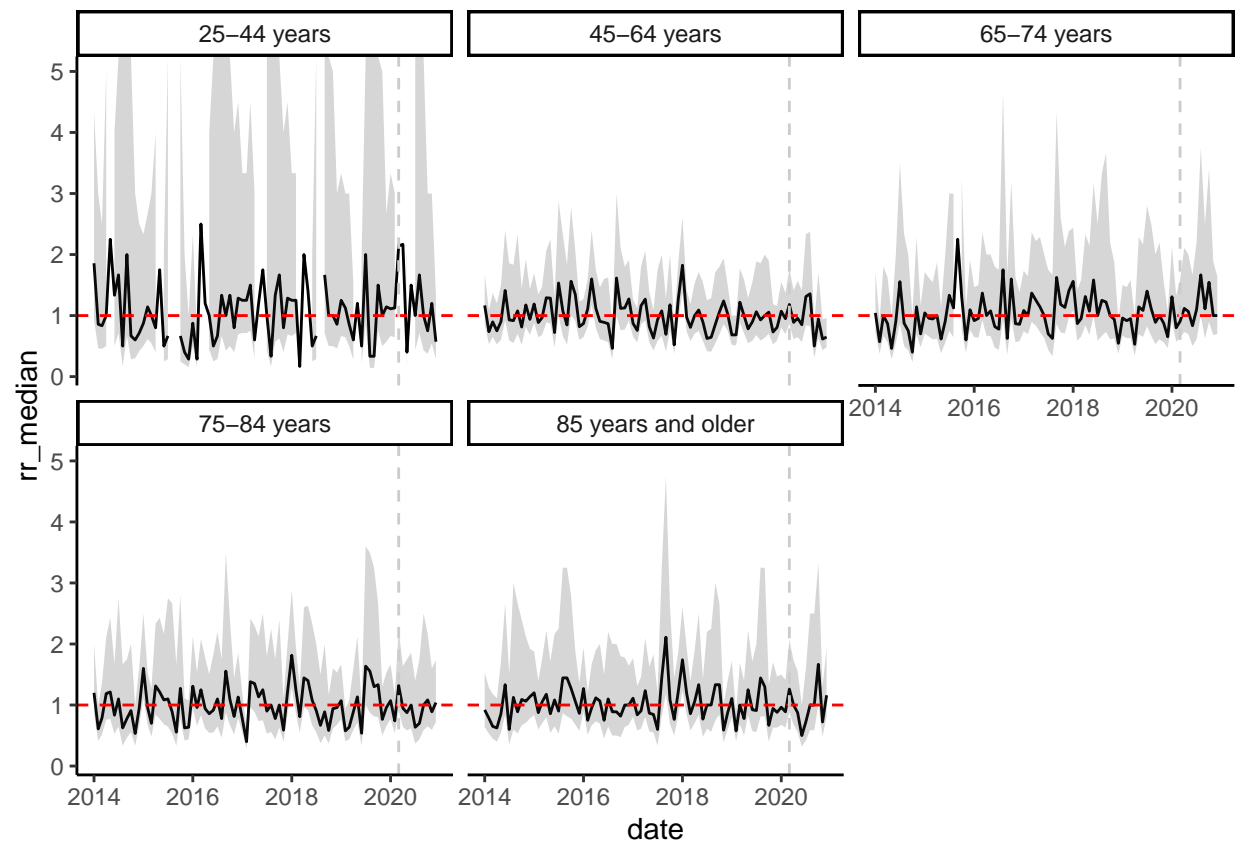
Fit model to 2014-2019 data, extrapolate to 2020 and beyond



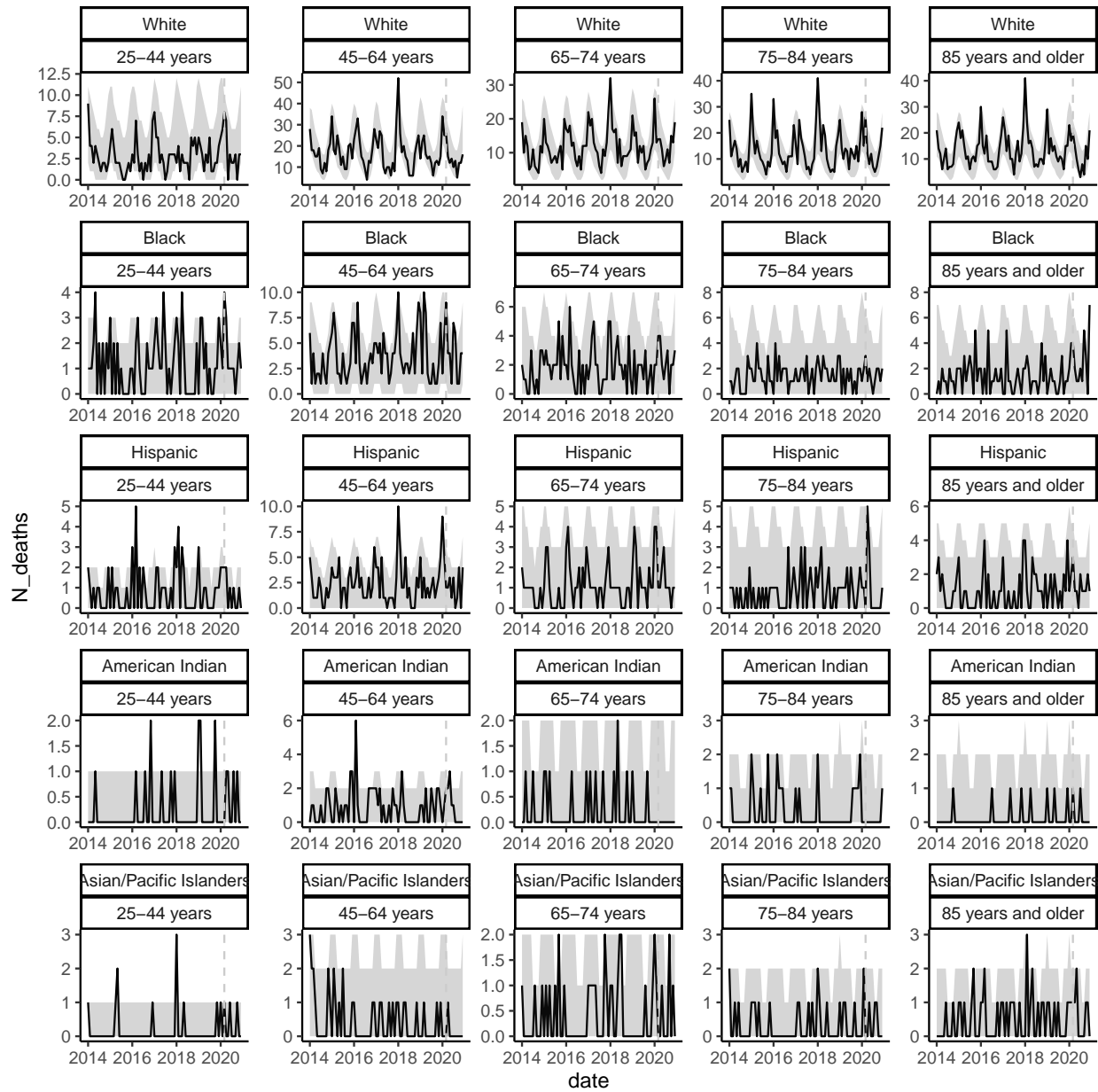




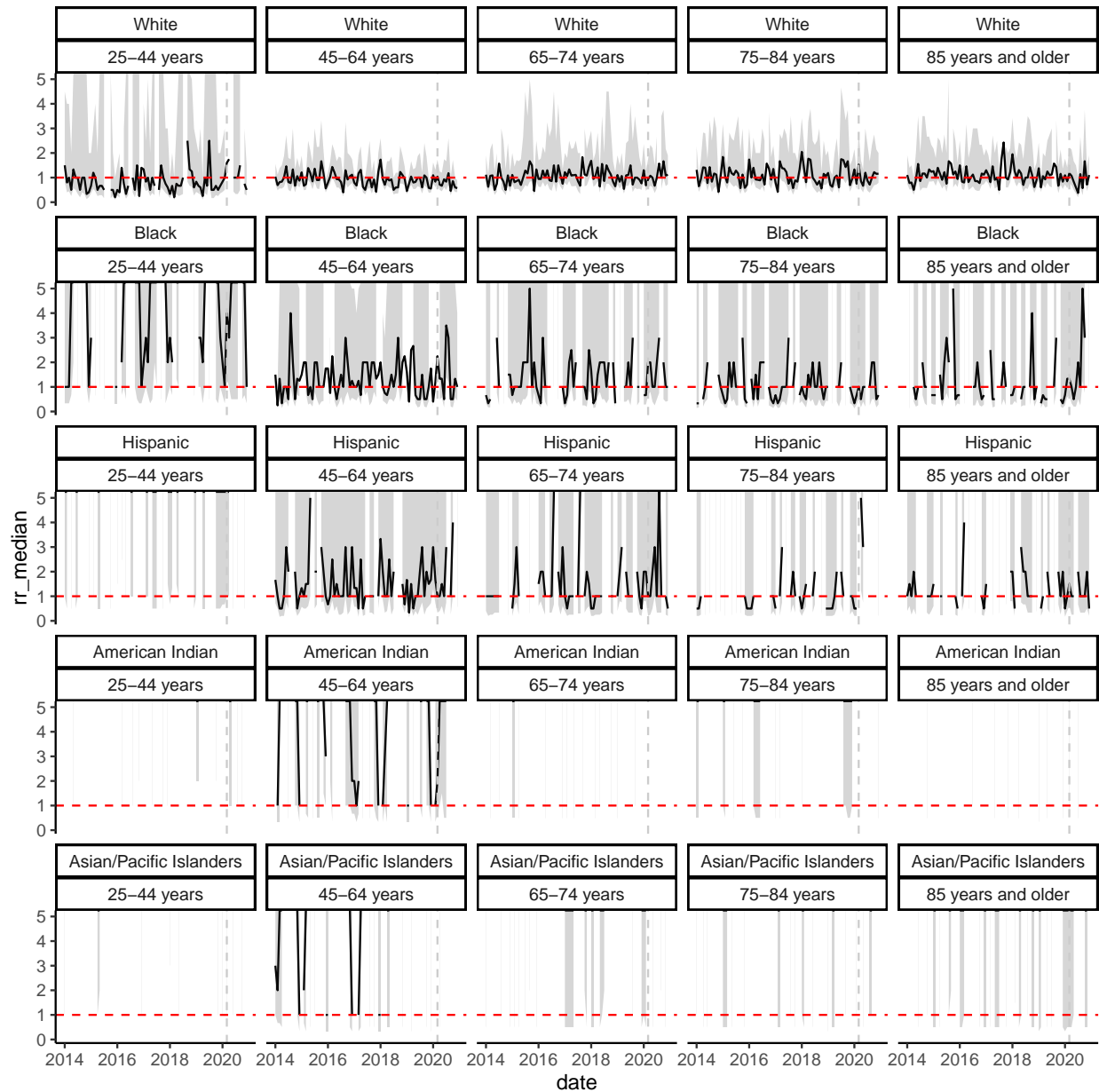
Did the rate change by age group or ethnic group?



race/ethnicity and age

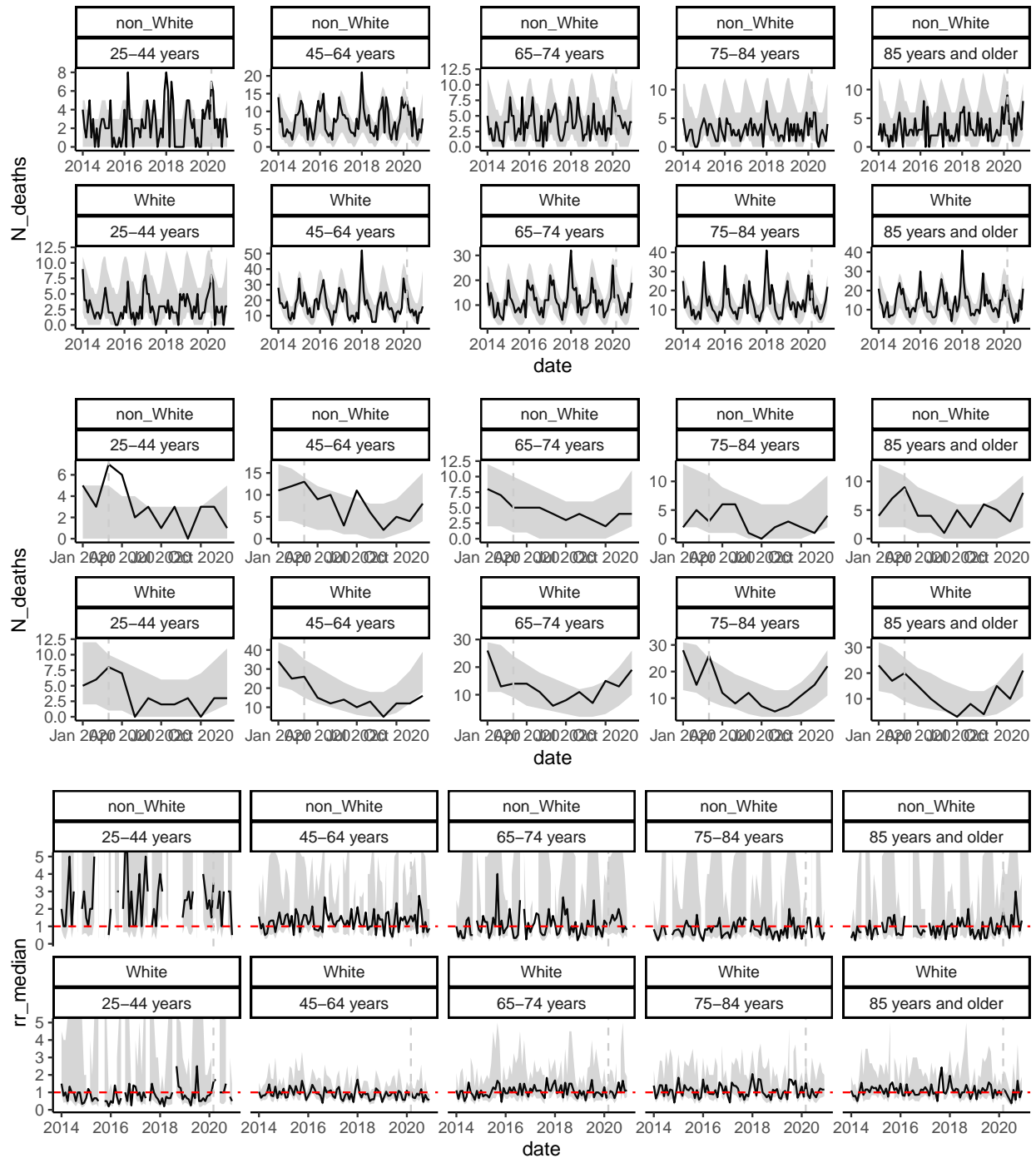


Warning: Removed 1 row(s) containing missing values (geom_path).



Non-white race/ethnicity is very sparse—try to dichotomize race (white vs non-white)

```
## 'summarise()' has grouped output by 'year', 'month', 'agec'. You can override
## using the '.groups' argument.
```



By region (for use with internal data only)

Occupation-86% missing

```
## [1] NA "074002939020" "701020819016" "620019077004" "402013786015"
## [6] "910025989023" "402013049002" "304010807016" "896521399005" "983024967022"
## [11] "605018017001" "901026989023" "382012947020" "962022786015" "043001749012"
## [16] "835021888019" "570017999023" "962022617008" "022001077004" "141004399005"
## [21] "470016477007" "913022837016" "165005819016" "272009786015" "962022497007"
## [26] "962022837016" "570017949020" "626019077004" "360011819016" "874021358005"
```

[31] "476016739012" "380012947020" "263009547007" "896521377005" "990025647009"
 ## [36] "635519077004" "770021159005" "364611819016" "422014939020" "715020877019"
 ## [41] "962022377005" "625019077004" "984024979022" "855021027001" "204006916019"
 ## [46] "360011827016" "325510819016" "983024979022" "500017467007" "413013868018"
 ## [51] "331010798016" "874021238005" "422014687010" "052002488007" "570017738012"
 ## [56] "350010827016" "200006837016" "012001919019" "035001809016" "275009856017"
 ## [61] "832021168005" "644019077004" "460015847016" "990025947020" "962022118005"
 ## [66] "962022287005" "714020358005" "962022027001" "814021077004" "231008786015"
 ## [71] "906025988023" "201606939020" "990025999023" "586017467007" "700020729012"
 ## [76] "832021148005" "835021168005" "962022939020" "422014916019" "770021269005"
 ## [81] "043001767014" "470016467007" "781021497007" "613018027001" "450015897019"
 ## [86] "350010819016" "605018117005" "941022629008" "153004057003" "516017687010"
 ## [91] "476016579007" "754020939020" "143004148005" "651519077004" "960022487007"
 ## [96] "846021148005" "385012947020" "846021157005" "964022399005" "275009916019"
 ## [101] "481016699010" "913022617008" "122003238005" "502017957020" "623019077004"
 ## [106] "720020877019" "023001786015" "962022238005" "001001687010" "043001237005"
 ## [111] "424014769014" "012001057003" "775021329005" "512017699010" "984024967022"
 ## [116] "031001868018" "700020399005" "325510948020" "962022129005" "470016538007"
 ## [121] "990025497007" "962022267005" "622019077004" "832021357005" "881021877019"
 ## [126] "930022629008" "492016707011" "154004729012" "200006947020" "306010797016"
 ## [131] "020501017001" "411013868018" "990025017001" "271009657009" "263009737012"
 ## [136] "483016767014" "526017819016" "814021887019" "371012947020" "451015898019"
 ## [141] "470016497007" "014001339005" "962022077004" "554017637008" "874021299005"
 ## [146] "570017837016" "043001668009" "653019077004" "420014866018" "642019077004"
 ## [151] "570017396005" "285009856017" "913022629008" "913022449006" "476016477007"
 ## [156] "342010819016" "912022618008" "043001648009" "001001917019" "260009856017"
 ## [161] "461015817016" "015001707011" "040001637008" "680019037002" "540017798016"
 ## [166] "102003668009" "012001687010" "400013868018" "562017497007" "404013869018"
 ## [171] "432015897019" "635519399005" "512017728012" "063002759014" "734020677009"
 ## [176] "043001999023" "042001837016" "962022407006" "063002948020" "330010818016"
 ## [181] "301010798016" "303010827016" "700020947020" "494016759014" "896521168005"
 ## [186] "002001077004" "102003738012" "770021109005" "474016907019" "770021339005"
 ## [191] "422014786015" "862021067003" "770021399005" "512017939020" "562017697010"
 ## [196] "201006817016" "803021188005" "830021907019" "714020939020" "020501018001"
 ## [201] "470016579007" "305010819016" "425014777014" "402013819016" "722020608008"
 ## [206] "470016508007" "626019668009" "512017497007" "220008787015" "586017939020"
 ## [211] "962022999023" "080002728012" "524017739012" "476016479507" "001001107005"
 ## [216] "990025689010" "825021199005" "736020267005" "423014819016" "822021357005"
 ## [221] "962022399005" "500017948020" "035001819016" "722020887019" "874021399005"
 ## [226] "524017539007" "002001917019" "632019077004" "874021077004" "041001707011"
 ## [231] "604018017001" "975022866018" "423014859017" "243008677009" "060002317005"
 ## [236] "043001398005" "420014769014" "472016579007" "471016427006" "680019049002"
 ## [241] "422014639008" "872021399005" "322010819016" "080002697010" "770021229005"
 ## [246] "476016489007" "404013868018" "913022469007" "471016668009" "232008786015"
 ## [251] "423014769014" "524017579007" "561017368005" "210007939020" "043001568007"
 ## [256] "552017947020" "570017797016" "570017459006" "402013868018" "720020467007"
 ## [261] "243008787015" "155004399005" "834021177005" "781021498007" "975022399005"
 ## [266] "570017467007" "962022357005" "364611787015" "990025357005" "200006809016"
 ## [271] "423014787015" "500017399005" "770021357005" "401013868018" "673019077004"
 ## [276] "201006837016" "570017757013" "524017939020" "476016497007" "990025338005"
 ## [281] "990025868018" "803021298005" "734020887019" "512017809016" "874021357005"
 ## [286] "913022129005" "052002467007" "524017497007" "351010819016" "906025579007"
 ## [291] "605018018001" "485016877019" "785521118005" "962022607008" "775021399005"
 ## [296] "234008819016" "340010819016" "422014769014" "972022779014" "080002077004"

```

## [301] "011001738012" "470016498007" "196505746012" "875021398005" "913022957020"
## [306] "263009159005" "214507727012" "425014859017" "700020467007" "393012859017"
## [311] "440015859017" "570017517007" "803021399005" "472016497007" "500017668009"
## [316] "422014809016" "393012707011" "586017819016" "476016467007" "234008837016"
## [321] "900022607008" "594017786015" "734020399005" "736020077004" "461015829016"
## [326] "094002728012" "485016417006" "402013827016" "570017917019" "423014929019"
## [331] "210007727012" "484016629008" "401013819016" "731520077004" "500017637008"
## [336] "907025989023" "881021049002" "586017579007" "803021939020" "570017948020"
## [341] "056502948020" "990025399005" "814021049002" "470016469007" "374012947020"
## [346] "423014866018" "586017948020" "012001747012" "770021377005" "913022269005"
## [351] "016001819016" "052002579007" "924022608008" "446515908019" "962022207005"
## [356] "825521787015" "394012947020" "013601787015" "570017786015" "500017837016"
## [361] "990025168005" "464015829016" "985024979022" "531017819016" "860021057003"
## [366] "570017819016" "960022427006" "476016718011" "233008786015" "020501029001"
## [371] "635519637008" "472016999023" "570017407006" "896521229005" "146004887019"
## [376] "325810797016" "141004939020" "780021868018" "906025786015" "153004729012"
## [381] "342010507007" "422014988023" "372012947020" "734020939020" "002001959020"
## [386] "234008337005" "136004077004" "990025629008" "733020109005" "060002077004"
## [391] "570017939020" "130004729012" "822021329005" "012001917019" "422014999023"
## [396] "726020469007" "832021888019" "734020999023" "035001798016" "002001999023"
## [401] "054002699010" "101003738012" "500017757013" "913022447006" "476016517007"
## [406] "525017787015" "636019077004" "403013868018" "883021538007" "143004729012"
## [411] "861021939020" "851021389505" "230008847016" "043001939020" "586017057003"
## [416] "803021077004" "043001757013" "632019939020" "570017017001" "013601999023"
## [421] "130004077004" "500017999023" "502017959020" "822021237005" "570017769014"
## [426] "772021399005" "500017787015" "415013868018" "775021287005" "394012077004"
## [431] "900022779014" "290009659009" "201006948020" "200006999023" "461015929019"
## [436] "476016528007" "043001057003"

```

```
## [1] 0.8629164
```

Education-2.5% missing

Education (1989 revision) 00 No formal education 00-08Years of elementary school 09 1 year of high school 10 2 years of high school 11 3 years of high school 12 4 years of high school 13 1 year of college 14 2 years of college 15 3 years of college 16 4 years of college 17 5 or more years of college 99 Not stated

Education (2003 revision) Field is blank for registration areas that are using the 1989 revision format of the item. 1 ... 8th grade or less 2 ... 9 - 12th grade, no diploma 3 ... high school graduate or GED completed 4 ... some college credit, but no degree 5 ... Associate degree 6 ... Bachelor's degree 7 ... Master's degree 8 ... Doctorate or professional degree 9 ... Unknown

Education reporting flag 0 1989 revision of education item on certificate 1 2003 revision of education item on certificate 2 no education item on certificate

education_recode: 1=HS or less; 2= some college or more; 99=missing

```

## [1] NA "09" "12" "17" "16" "13" "11" "14" "08" "00" "04" "10" "99" "01" "07"
## [16] "06" "15" "02"

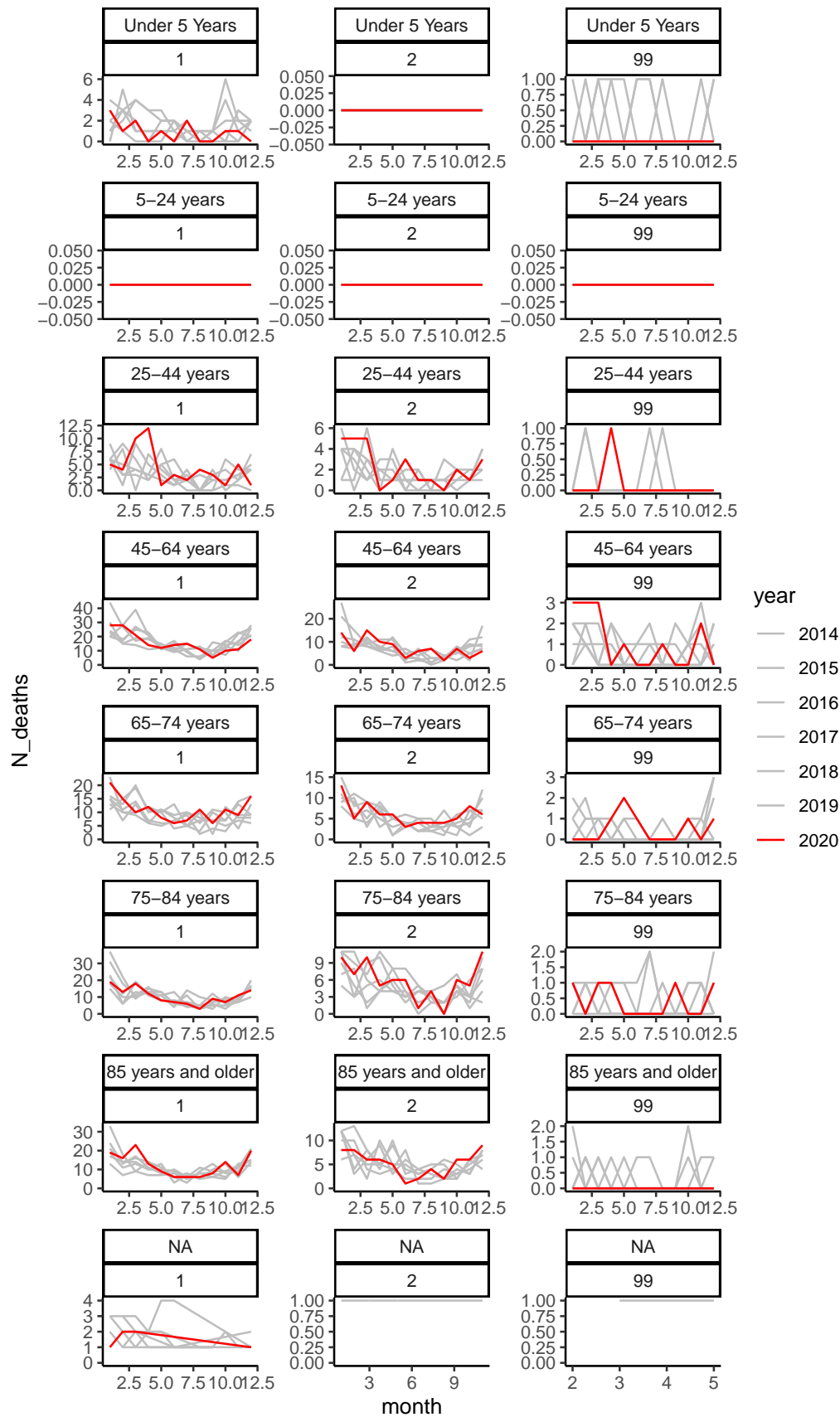
```

```
## [1] "5" "2" "1" NA "3" "6" "9" "4" "7" "8"
```

```
## [1] "1" "0"
```

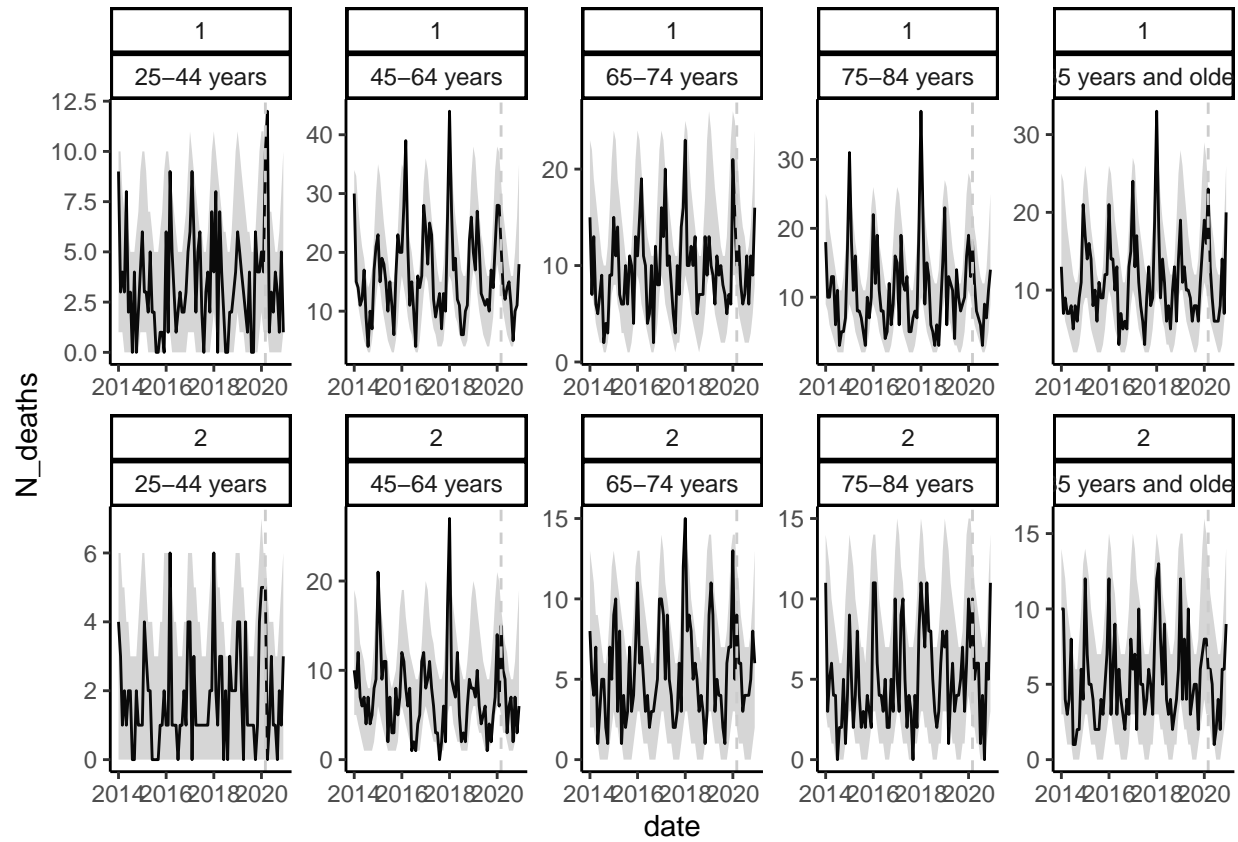
```
##  
##      1      2    99  
## 4501 2082  172
```

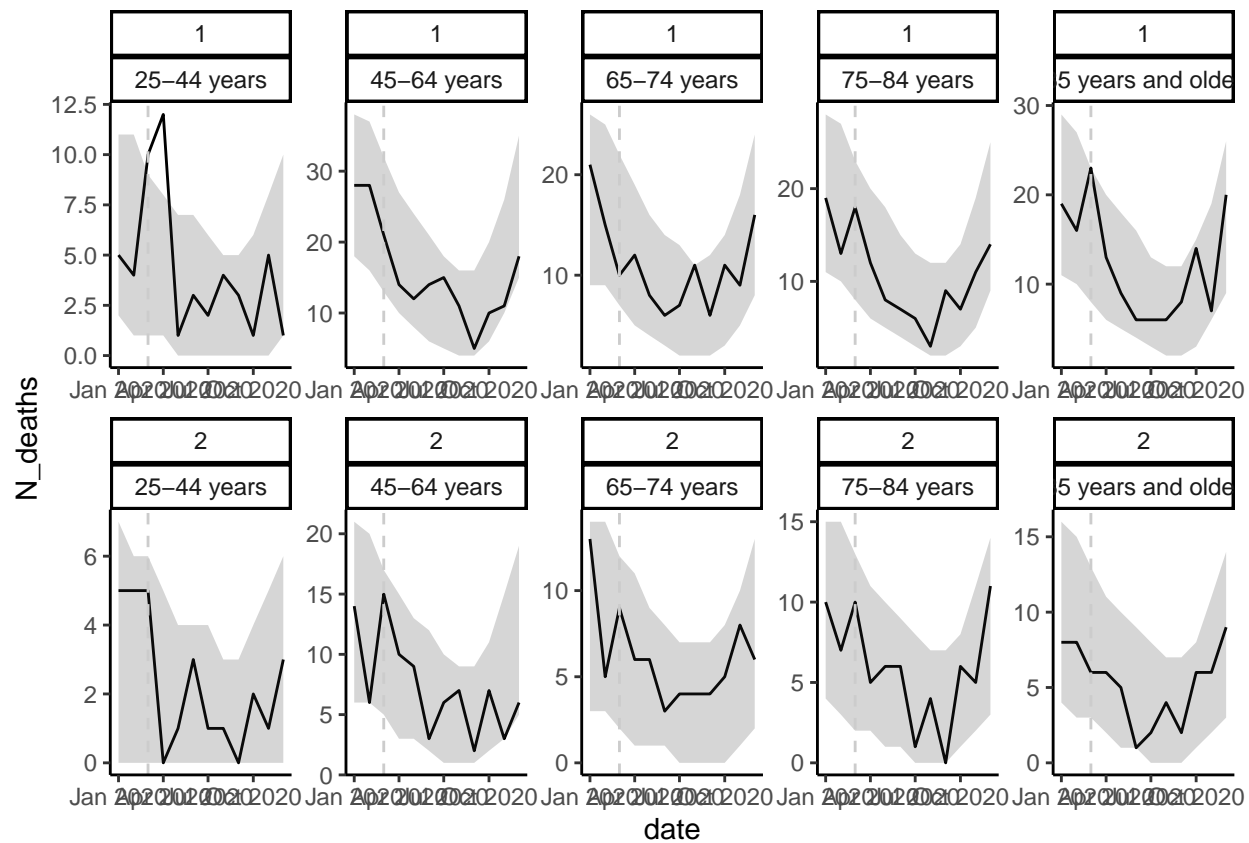
```
## 'summarise()' has grouped output by 'year', 'month', 'agec'. You can override  
## using the '.groups' argument.
```

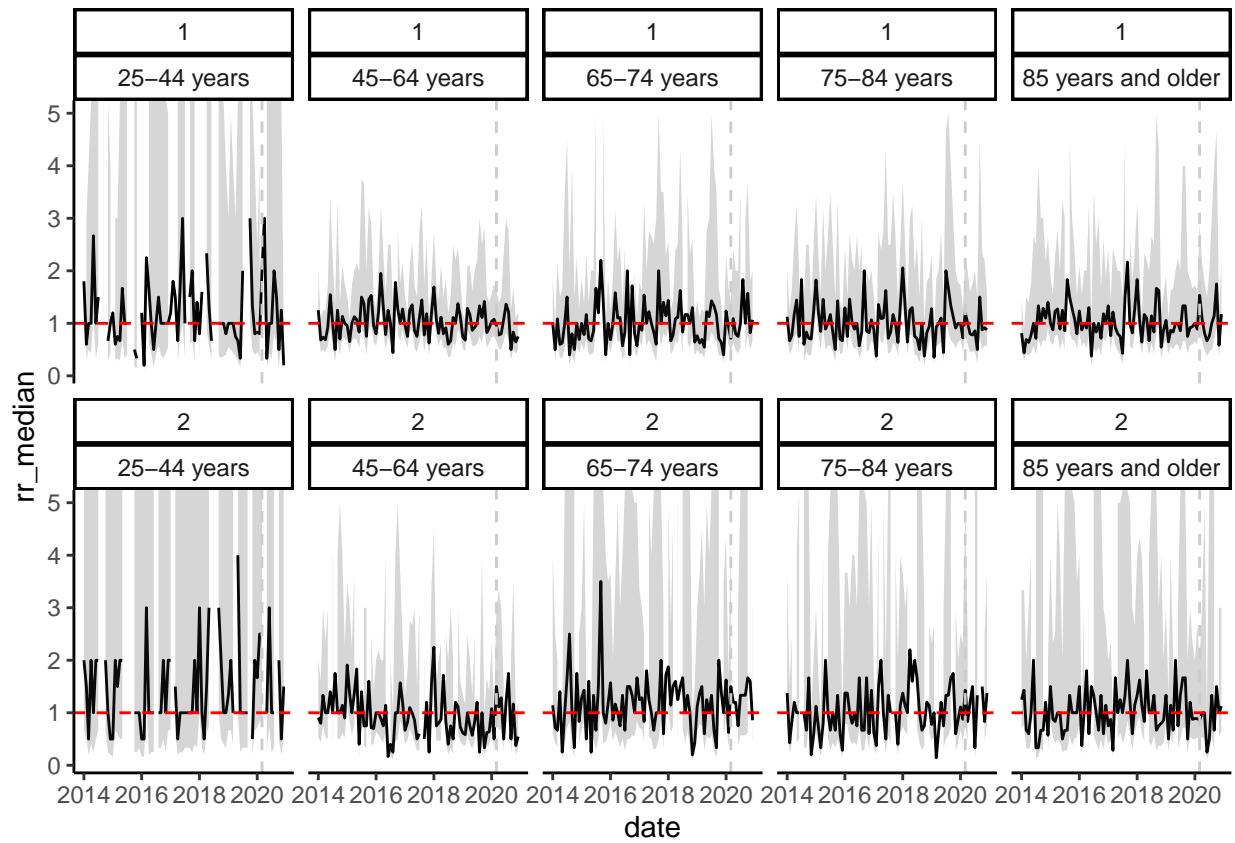



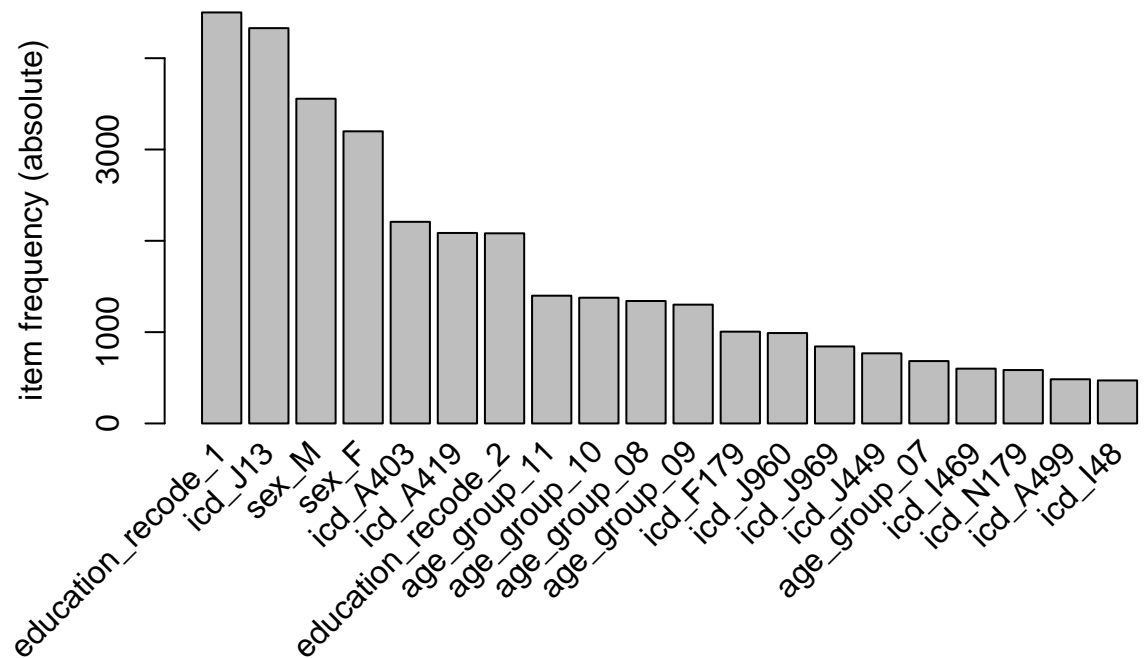
This shows a clear spike in pneumococcal mortality among young adults with HS education or lower during the first wave. This makes sense since these people are probably the least likely to be able to isolate

```
## 'summarise()' has grouped output by 'year', 'month', 'agec'. You can override
## using the '.groups' argument.
```









Market basket analysis

```
## Apriori
##
## Parameter specification:
## confidence minval smax arem aval originalSupport maxtime support minlen
##      0.5      0.1    1 none FALSE                TRUE      5   0.001      1
## maxlen target ext
##      10  rules TRUE
##
## Algorithmic control:
## filter tree heap memopt load sort verbose
##      0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 6
##
## set item appearances ...[1 item(s)] done [0.00s].
## set transactions ...[1114 item(s), 6756 transaction(s)] done [0.01s].
## sorting and recoding items ... [338 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 3 4 5 6 7 8 done [0.02s].
## writing ... [10501 rule(s)] done [0.00s].
## creating S4 object ... done [0.00s].

## set of 10501 rules
##
## rule length distribution (lhs + rhs):sizes
```

```

##      1      2      3      4      5      6      7      8
##      1 217 1739 3948 3315 1106 165 10
##
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.00    4.00    4.00    4.37    5.00    8.00
##
## summary of quality measures:
##      support      confidence      coverage      lift
##      Min.    :0.001036   Min.    :0.5000   Min.    :0.001036   Min.    :0.7803
##      1st Qu.:0.001184   1st Qu.:0.7143   1st Qu.:0.001480   1st Qu.:1.1147
##      Median :0.001628   Median :0.8438   Median :0.002072   Median :1.3168
##      Mean   :0.003514   Mean   :0.8236   Mean   :0.004568   Mean   :1.2853
##      3rd Qu.:0.002812   3rd Qu.:0.9444   3rd Qu.:0.003552   3rd Qu.:1.4739
##      Max.    :0.640764   Max.    :1.0000   Max.    :1.000000   Max.    :1.5606
##      count
##      Min.    : 7.00
##      1st Qu.: 8.00
##      Median : 11.00
##      Mean   : 23.74
##      3rd Qu.: 19.00
##      Max.    :4329.00
##
## mining info:
##      data ntransactions support confidence
##      order_trans      6756 0.001      0.5
##
## apriori(data = order_trans, parameter = list(supp = 0.001, conf = 0.5), appearance = list(default =

##      lhs      rhs      support confidence coverage
## [1] {icd_G122} => {icd_J13} 0.0012 1 0.0012
## [2] {icd_J155} => {icd_J13} 0.0010 1 0.0010
## [3] {icd_J47}  => {icd_J13} 0.0013 1 0.0013
## [4] {icd_B948} => {icd_J13} 0.0016 1 0.0016
## [5] {icd_J14}  => {icd_J13} 0.0024 1 0.0024
## [6] {education_recode_1, icd_I461} => {icd_J13} 0.0010 1 0.0010
## [7] {icd_J47, sex_M} => {icd_J13} 0.0010 1 0.0010
## [8] {age_group_11, icd_S720} => {icd_J13} 0.0010 1 0.0010
## [9] {education_recode_1, icd_S720} => {icd_J13} 0.0010 1 0.0010
## [10] {icd_B948, sex_F} => {icd_J13} 0.0010 1 0.0010
## [11] {icd_K259, icd_K922} => {icd_J13} 0.0012 1 0.0012
## [12] {icd_A419, icd_Y434} => {icd_J13} 0.0010 1 0.0010
## [13] {education_recode_1, icd_R91} => {icd_J13} 0.0012 1 0.0012
## [14] {icd_I490, sex_M} => {icd_J13} 0.0010 1 0.0010
## [15] {icd_T436, icd_X44} => {icd_J13} 0.0010 1 0.0010
## [16] {education_recode_1, icd_T436} => {icd_J13} 0.0018 1 0.0018
## [17] {icd_J14, sex_M} => {icd_J13} 0.0019 1 0.0019
## [18] {education_recode_1, icd_J14} => {icd_J13} 0.0019 1 0.0019
## [19] {age_group_11, icd_I709} => {icd_J13} 0.0012 1 0.0012
## [20] {icd_A419, icd_C920} => {icd_J13} 0.0010 1 0.0010
## [21] {icd_A419, icd_F159} => {icd_J13} 0.0012 1 0.0012
## [22] {icd_A419, icd_C220} => {icd_J13} 0.0010 1 0.0010
## [23] {age_group_09, icd_J849} => {icd_J13} 0.0010 1 0.0010
## [24] {icd_F179, icd_K559} => {icd_J13} 0.0010 1 0.0010
## [25] {icd_A419, icd_R064} => {icd_J13} 0.0010 1 0.0010

```

## [26]	{icd_R064, sex_F}	=> {icd_J13}	0.0015	1	0.0015
## [27]	{icd_A419, icd_D899}	=> {icd_J13}	0.0012	1	0.0012
## [28]	{icd_A419, icd_X599}	=> {icd_J13}	0.0015	1	0.0015
## [29]	{icd_A419, icd_E875}	=> {icd_J13}	0.0013	1	0.0013
## [30]	{icd_C780, icd_J960}	=> {icd_J13}	0.0010	1	0.0010
## [31]	{age_group_10, icd_J81}	=> {icd_J13}	0.0010	1	0.0010
## [32]	{icd_A419, icd_A490}	=> {icd_J13}	0.0018	1	0.0018
## [33]	{icd_A419, icd_J984}	=> {icd_J13}	0.0010	1	0.0010
## [34]	{icd_A419, icd_A498}	=> {icd_J13}	0.0018	1	0.0018
## [35]	{age_group_09, icd_I694}	=> {icd_J13}	0.0012	1	0.0012
## [36]	{icd_A419, icd_I694}	=> {icd_J13}	0.0016	1	0.0016
## [37]	{icd_F179, icd_J939}	=> {icd_J13}	0.0012	1	0.0012
## [38]	{icd_F109, icd_J80}	=> {icd_J13}	0.0010	1	0.0010
## [39]	{icd_A419, icd_C911}	=> {icd_J13}	0.0022	1	0.0022
## [40]	{icd_C189, icd_J960}	=> {icd_J13}	0.0010	1	0.0010
## [41]	{icd_J841, icd_J969}	=> {icd_J13}	0.0021	1	0.0021
## [42]	{icd_A419, icd_J841}	=> {icd_J13}	0.0018	1	0.0018
## [43]	{age_group_09, icd_J459}	=> {icd_J13}	0.0012	1	0.0012
## [44]	{age_group_11, icd_N289}	=> {icd_J13}	0.0019	1	0.0019
## [45]	{icd_B348, icd_J449}	=> {icd_J13}	0.0015	1	0.0015
## [46]	{icd_B348, icd_J960}	=> {icd_J13}	0.0013	1	0.0013
## [47]	{icd_B348, icd_F179}	=> {icd_J13}	0.0021	1	0.0021
## [48]	{icd_A419, icd_R53}	=> {icd_J13}	0.0018	1	0.0018
## [49]	{icd_A419, icd_D619}	=> {icd_J13}	0.0025	1	0.0025
## [50]	{icd_F179, icd_R13}	=> {icd_J13}	0.0012	1	0.0012
## [51]	{age_group_07, icd_J152}	=> {icd_J13}	0.0013	1	0.0013
## [52]	{age_group_10, icd_J152}	=> {icd_J13}	0.0010	1	0.0010
## [53]	{icd_C509, icd_F179}	=> {icd_J13}	0.0012	1	0.0012
## [54]	{age_group_08, icd_I255}	=> {icd_J13}	0.0015	1	0.0015
## [55]	{icd_A419, icd_F191}	=> {icd_J13}	0.0015	1	0.0015
## [56]	{icd_E669, icd_J449}	=> {icd_J13}	0.0010	1	0.0010
## [57]	{icd_G473, icd_J440}	=> {icd_J13}	0.0010	1	0.0010
## [58]	{icd_G473, icd_J449}	=> {icd_J13}	0.0013	1	0.0013
## [59]	{icd_G473, icd_J960}	=> {icd_J13}	0.0013	1	0.0013
## [60]	{icd_F179, icd_G473}	=> {icd_J13}	0.0016	1	0.0016
## [61]	{icd_A419, icd_G473}	=> {icd_J13}	0.0021	1	0.0021
## [62]	{icd_J80, icd_R570}	=> {icd_J13}	0.0010	1	0.0010
## [63]	{icd_J111, icd_J80}	=> {icd_J13}	0.0013	1	0.0013
## [64]	{age_group_09, icd_J111}	=> {icd_J13}	0.0012	1	0.0012
## [65]	{icd_A419, icd_J111}	=> {icd_J13}	0.0024	1	0.0024
## [66]	{icd_E039, icd_F179}	=> {icd_J13}	0.0013	1	0.0013
## [67]	{icd_A419, icd_E039}	=> {icd_J13}	0.0022	1	0.0022
## [68]	{icd_I272, icd_J440}	=> {icd_J13}	0.0012	1	0.0012
## [69]	{icd_A419, icd_I272}	=> {icd_J13}	0.0025	1	0.0025
## [70]	{icd_J440, icd_J869}	=> {icd_J13}	0.0010	1	0.0010
## [71]	{icd_I48, icd_J869}	=> {icd_J13}	0.0015	1	0.0015
## [72]	{icd_J869, icd_N179}	=> {icd_J13}	0.0012	1	0.0012
## [73]	{icd_J440, icd_R568}	=> {icd_J13}	0.0013	1	0.0013
## [74]	{icd_J449, icd_R568}	=> {icd_J13}	0.0018	1	0.0018
## [75]	{icd_J110, icd_J960}	=> {icd_J13}	0.0022	1	0.0022
## [76]	{age_group_11, icd_J110}	=> {icd_J13}	0.0012	1	0.0012
## [77]	{icd_A419, icd_J110}	=> {icd_J13}	0.0034	1	0.0034
## [78]	{icd_I269, icd_J80}	=> {icd_J13}	0.0010	1	0.0010
## [79]	{icd_F179, icd_I250}	=> {icd_J13}	0.0016	1	0.0016

## [80]	{icd_A419, icd_I250}	=> {icd_J13}	0.0018	1	0.0018
## [81]	{icd_A419, icd_J439}	=> {icd_J13}	0.0025	1	0.0025
## [82]	{icd_J440, icd_R068}	=> {icd_J13}	0.0021	1	0.0021
## [83]	{icd_J440, icd_K922}	=> {icd_J13}	0.0012	1	0.0012
## [84]	{icd_J449, icd_K922}	=> {icd_J13}	0.0018	1	0.0018
## [85]	{icd_J440, icd_J441}	=> {icd_J13}	0.0064	1	0.0064
## [86]	{icd_J441, icd_N179}	=> {icd_J13}	0.0013	1	0.0013
## [87]	{age_group_11, icd_J441}	=> {icd_J13}	0.0013	1	0.0013
## [88]	{age_group_08, icd_J441}	=> {icd_J13}	0.0019	1	0.0019
## [89]	{icd_B24, icd_J80}	=> {icd_J13}	0.0010	1	0.0010
## [90]	{icd_R092, icd_U071}	=> {icd_J13}	0.0010	1	0.0010
## [91]	{icd_I251, icd_U071}	=> {icd_J13}	0.0010	1	0.0010
## [92]	{icd_A499, icd_U071}	=> {icd_J13}	0.0010	1	0.0010
## [93]	{icd_E119, icd_J100}	=> {icd_J13}	0.0012	1	0.0012
## [94]	{icd_J100, icd_K746}	=> {icd_J13}	0.0013	1	0.0013
## [95]	{icd_I10, icd_J100}	=> {icd_J13}	0.0016	1	0.0016
## [96]	{age_group_07, icd_J100}	=> {icd_J13}	0.0022	1	0.0022
## [97]	{icd_J100, icd_N179}	=> {icd_J13}	0.0030	1	0.0030
## [98]	{icd_J100, icd_J969}	=> {icd_J13}	0.0024	1	0.0024
## [99]	{icd_J100, icd_J449}	=> {icd_J13}	0.0027	1	0.0027
## [100]	{icd_J100, icd_J960}	=> {icd_J13}	0.0034	1	0.0034
##	lift count				
## [1]	1.6	8			
## [2]	1.6	7			
## [3]	1.6	9			
## [4]	1.6	11			
## [5]	1.6	16			
## [6]	1.6	7			
## [7]	1.6	7			
## [8]	1.6	7			
## [9]	1.6	7			
## [10]	1.6	7			
## [11]	1.6	8			
## [12]	1.6	7			
## [13]	1.6	8			
## [14]	1.6	7			
## [15]	1.6	7			
## [16]	1.6	12			
## [17]	1.6	13			
## [18]	1.6	13			
## [19]	1.6	8			
## [20]	1.6	7			
## [21]	1.6	8			
## [22]	1.6	7			
## [23]	1.6	7			
## [24]	1.6	7			
## [25]	1.6	7			
## [26]	1.6	10			
## [27]	1.6	8			
## [28]	1.6	10			
## [29]	1.6	9			
## [30]	1.6	7			
## [31]	1.6	7			
## [32]	1.6	12			

##	[33]	1.6	7
##	[34]	1.6	12
##	[35]	1.6	8
##	[36]	1.6	11
##	[37]	1.6	8
##	[38]	1.6	7
##	[39]	1.6	15
##	[40]	1.6	7
##	[41]	1.6	14
##	[42]	1.6	12
##	[43]	1.6	8
##	[44]	1.6	13
##	[45]	1.6	10
##	[46]	1.6	9
##	[47]	1.6	14
##	[48]	1.6	12
##	[49]	1.6	17
##	[50]	1.6	8
##	[51]	1.6	9
##	[52]	1.6	7
##	[53]	1.6	8
##	[54]	1.6	10
##	[55]	1.6	10
##	[56]	1.6	7
##	[57]	1.6	7
##	[58]	1.6	9
##	[59]	1.6	9
##	[60]	1.6	11
##	[61]	1.6	14
##	[62]	1.6	7
##	[63]	1.6	9
##	[64]	1.6	8
##	[65]	1.6	16
##	[66]	1.6	9
##	[67]	1.6	15
##	[68]	1.6	8
##	[69]	1.6	17
##	[70]	1.6	7
##	[71]	1.6	10
##	[72]	1.6	8
##	[73]	1.6	9
##	[74]	1.6	12
##	[75]	1.6	15
##	[76]	1.6	8
##	[77]	1.6	23
##	[78]	1.6	7
##	[79]	1.6	11
##	[80]	1.6	12
##	[81]	1.6	17
##	[82]	1.6	14
##	[83]	1.6	8
##	[84]	1.6	12
##	[85]	1.6	43
##	[86]	1.6	9

```
## [87] 1.6 9
## [88] 1.6 13
## [89] 1.6 7
## [90] 1.6 7
## [91] 1.6 7
## [92] 1.6 7
## [93] 1.6 8
## [94] 1.6 9
## [95] 1.6 11
## [96] 1.6 15
## [97] 1.6 20
## [98] 1.6 16
## [99] 1.6 18
## [100] 1.6 23
```

```
## Warning: Too many rules supplied. Only plotting the best 100 using
## 'confidence' (change control parameter max if needed).
```

```
## Warning: ggrepel: 9 unlabeled data points (too many overlaps). Consider
## increasing max.overlaps
```

