

Significant Predictors

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Initial Dataset Information

The number of observations and variables in the initial dataset.

```
[1] 32416    69
```

Remove nonvalue predictors

Only iso_code and tests_units hold no significant value.

```
# A tibble: 5 x 69
  iso_code tests_units    continent location date      total_cases new_cases
  <chr>    <chr>          <chr>    <chr>   <date>          <dbl>    <dbl>
1 ARG      tests performed South Amer~ Argenti~ 2020-01-01         NA         NA
2 ARG      tests performed South Amer~ Argenti~ 2020-01-02         NA         NA
3 ARG      tests performed South Amer~ Argenti~ 2020-01-03         NA          0
4 ARG      tests performed South Amer~ Argenti~ 2020-01-04         NA          0
5 ARG      tests performed South Amer~ Argenti~ 2020-01-05         NA          0
# i 62 more variables: new_cases_smoothed <dbl>, total_deaths <dbl>,
#   new_deaths <dbl>, new_deaths_smoothed <dbl>, total_cases_per_million <dbl>,
#   new_cases_per_million <dbl>, new_cases_smoothed_per_million <dbl>,
#   total_deaths_per_million <dbl>, new_deaths_per_million <dbl>,
#   new_deaths_smoothed_per_million <dbl>, reproduction_rate <dbl>,
#   icu_patients <dbl>, icu_patients_per_million <dbl>, hosp_patients <dbl>,
#   hosp_patients_per_million <dbl>, weekly_icu_admissions <dbl>, ...
```

Remove nonsignificant predictors

The predictors with large missingness.

```
[1] "tests_units"
[2] "icu_patients"
[3] "icu_patients_per_million"
[4] "hosp_patients"
[5] "hosp_patients_per_million"
[6] "weekly_icu_admissions"
[7] "weekly_icu_admissions_per_million"
[8] "weekly_hosp_admissions"
[9] "weekly_hosp_admissions_per_million"
[10] "total_tests"
[11] "new_tests"
[12] "total_tests_per_thousand"
[13] "new_tests_per_thousand"
[14] "new_tests_smoothed"
[15] "new_tests_smoothed_per_thousand"
[16] "positive_rate"
[17] "tests_per_case"
[18] "total_vaccinations"
[19] "people_vaccinated"
[20] "people_fully_vaccinated"
[21] "total_boosters"
[22] "new_vaccinations"
[23] "new_vaccinations_smoothed"
[24] "total_vaccinations_per_hundred"
[25] "people_vaccinated_per_hundred"
[26] "people_fully_vaccinated_per_hundred"
[27] "total_boosters_per_hundred"
[28] "new_vaccinations_smoothed_per_million"
[29] "new_people_vaccinated_smoothed"
[30] "new_people_vaccinated_smoothed_per_hundred"
[31] "handwashing_facilities"
[32] "excess_mortality_cumulative_absolute"
[33] "excess_mortality_cumulative"
[34] "excess_mortality"
[35] "excess_mortality_cumulative_per_million"
```

The predictors with large missingness, but are significant to predicting new_cases and thus, kept.

	new_cases	icu_patients
new_cases	1.000	0.350
icu_patients	0.350	1.000
icu_patients_per_million	0.169	0.603
hosp_patients	0.497	0.944
hosp_patients_per_million	0.252	0.370
weekly_icu_admissions	0.132	0.914
weekly_icu_admissions_per_million	0.123	0.921
weekly_hosp_admissions	0.409	0.929
weekly_hosp_admissions_per_million	0.363	0.581
total_tests	0.288	0.499
new_tests	0.372	0.692
total_tests_per_thousand	0.238	0.023
new_tests_per_thousand	0.231	0.064
new_tests_smoothed	0.023	0.719
new_tests_smoothed_per_thousand	0.235	0.074
positive_rate	0.204	0.120
tests_per_case	-0.040	-0.116
total_vaccinations	0.161	0.303
people_vaccinated	0.036	0.383
people_fully_vaccinated	0.023	0.360
total_boosters	0.068	0.037
new_vaccinations	0.020	0.493
new_vaccinations_smoothed	0.038	0.531
total_vaccinations_per_hundred	0.097	-0.229
people_vaccinated_per_hundred	0.085	-0.199
people_fully_vaccinated_per_hundred	0.089	-0.206
total_boosters_per_hundred	0.086	-0.296
new_vaccinations_smoothed_per_million	0.004	0.063
new_people_vaccinated_smoothed	0.025	0.497
new_people_vaccinated_smoothed_per_hundred	-0.030	0.127
handwashing_facilities	0.030	NA
excess_mortality_cumulative_absolute	0.030	0.461
excess_mortality_cumulative	-0.117	0.319
excess_mortality	-0.008	0.320
excess_mortality_cumulative_per_million	-0.064	0.143
	icu_patients_per_million	
new_cases	0.169	
icu_patients	0.603	
icu_patients_per_million	1.000	
hosp_patients	0.754	
hosp_patients_per_million	0.805	
weekly_icu_admissions	0.889	

weekly_icu_admissions_per_million	0.919
weekly_hosp_admissions	0.540
weekly_hosp_admissions_per_million	0.723
total_tests	0.088
new_tests	0.237
total_tests_per_thousand	-0.087
new_tests_per_thousand	0.033
new_tests_smoothed	0.243
new_tests_smoothed_per_thousand	0.039
positive_rate	0.368
tests_per_case	-0.191
total_vaccinations	-0.113
people_vaccinated	-0.070
people_fully_vaccinated	-0.088
total_boosters	-0.221
new_vaccinations	0.224
new_vaccinations_smoothed	0.248
total_vaccinations_per_hundred	-0.417
people_vaccinated_per_hundred	-0.400
people_fully_vaccinated_per_hundred	-0.425
total_boosters_per_hundred	-0.391
new_vaccinations_smoothed_per_million	0.207
new_people_vaccinated_smoothed	0.293
new_people_vaccinated_smoothed_per_hundred	0.318
handwashing_facilities	NA
excess_mortality_cumulative_absolute	0.101
excess_mortality_cumulative	0.238
excess_mortality	0.508
excess_mortality_cumulative_per_million	0.005
hosp_patients	
new_cases	0.497
icu_patients	0.944
icu_patients_per_million	0.754
hosp_patients	1.000
hosp_patients_per_million	0.568
weekly_icu_admissions	0.780
weekly_icu_admissions_per_million	0.790
weekly_hosp_admissions	0.959
weekly_hosp_admissions_per_million	0.730
total_tests	0.525
new_tests	0.701
total_tests_per_thousand	0.085
new_tests_per_thousand	0.104

new_tests_smoothed	0.741
new_tests_smoothed_per_thousand	0.116
positive_rate	0.187
tests_per_case	-0.164
total_vaccinations	0.402
people_vaccinated	0.447
people_fully_vaccinated	0.435
total_boosters	0.246
new_vaccinations	0.437
new_vaccinations_smoothed	0.471
total_vaccinations_per_hundred	-0.133
people_vaccinated_per_hundred	-0.127
people_fully_vaccinated_per_hundred	-0.129
total_boosters_per_hundred	-0.199
new_vaccinations_smoothed_per_million	0.003
new_people_vaccinated_smoothed	0.420
new_people_vaccinated_smoothed_per_hundred	0.057
handwashing_facilities	NA
excess_mortality_cumulative_absolute	0.498
excess_mortality_cumulative	0.347
excess_mortality	0.349
excess_mortality_cumulative_per_million	0.178
hosp_patients_per_million	
new_cases	0.252
icu_patients	0.370
icu_patients_per_million	0.805
hosp_patients	0.568
hosp_patients_per_million	1.000
weekly_icu_admissions	0.762
weekly_icu_admissions_per_million	0.779
weekly_hosp_admissions	0.249
weekly_hosp_admissions_per_million	0.759
total_tests	0.126
new_tests	0.257
total_tests_per_thousand	0.155
new_tests_per_thousand	0.206
new_tests_smoothed	0.278
new_tests_smoothed_per_thousand	0.231
positive_rate	0.360
tests_per_case	-0.257
total_vaccinations	-0.100
people_vaccinated	-0.109
people_fully_vaccinated	-0.099

total_boosters	0.053
new_vaccinations	0.051
new_vaccinations_smoothed	0.067
total_vaccinations_per_hundred	-0.086
people_vaccinated_per_hundred	-0.183
people_fully_vaccinated_per_hundred	-0.124
total_boosters_per_hundred	0.079
new_vaccinations_smoothed_per_million	0.020
new_people_vaccinated_smoothed	0.098
new_people_vaccinated_smoothed_per_hundred	0.069
handwashing_facilities	NA
excess_mortality_cumulative_absolute	-0.035
excess_mortality_cumulative	0.195
excess_mortality	0.455
excess_mortality_cumulative_per_million	0.028
weekly_icu_admissions	
new_cases	0.132
icu_patients	0.914
icu_patients_per_million	0.889
hosp_patients	0.780
hosp_patients_per_million	0.762
weekly_icu_admissions	1.000
weekly_icu_admissions_per_million	0.987
weekly_hosp_admissions	0.878
weekly_hosp_admissions_per_million	0.848
total_tests	-0.092
new_tests	0.288
total_tests_per_thousand	-0.137
new_tests_per_thousand	0.249
new_tests_smoothed	0.302
new_tests_smoothed_per_thousand	0.232
positive_rate	0.265
tests_per_case	-0.463
total_vaccinations	-0.252
people_vaccinated	-0.266
people_fully_vaccinated	-0.238
total_boosters	-0.236
new_vaccinations	0.321
new_vaccinations_smoothed	0.344
total_vaccinations_per_hundred	-0.449
people_vaccinated_per_hundred	-0.507
people_fully_vaccinated_per_hundred	-0.453
total_boosters_per_hundred	-0.383

new_vaccinations_smoothed_per_million	0.287
new_people_vaccinated_smoothed	0.229
new_people_vaccinated_smoothed_per_hundred	0.201
handwashing_facilities	NA
excess_mortality_cumulative_absolute	-0.478
excess_mortality_cumulative	-0.318
excess_mortality	0.446
excess_mortality_cumulative_per_million	-0.503
weekly_icu_admissions_per_million	
new_cases	0.123
icu_patients	0.921
icu_patients_per_million	0.919
hosp_patients	0.790
hosp_patients_per_million	0.779
weekly_icu_admissions	0.987
weekly_icu_admissions_per_million	1.000
weekly_hosp_admissions	0.871
weekly_hosp_admissions_per_million	0.871
total_tests	-0.107
new_tests	0.288
total_tests_per_thousand	-0.145
new_tests_per_thousand	0.255
new_tests_smoothed	0.341
new_tests_smoothed_per_thousand	0.288
positive_rate	0.246
tests_per_case	-0.470
total_vaccinations	-0.370
people_vaccinated	-0.394
people_fully_vaccinated	-0.361
total_boosters	-0.302
new_vaccinations	0.325
new_vaccinations_smoothed	0.348
total_vaccinations_per_hundred	-0.523
people_vaccinated_per_hundred	-0.581
people_fully_vaccinated_per_hundred	-0.529
total_boosters_per_hundred	-0.418
new_vaccinations_smoothed_per_million	0.310
new_people_vaccinated_smoothed	0.276
new_people_vaccinated_smoothed_per_hundred	0.254
handwashing_facilities	NA
excess_mortality_cumulative_absolute	-0.471
excess_mortality_cumulative	-0.219
excess_mortality	0.454

excess_mortality_cumulative_per_million	-0.470
	weekly_hosp_admissions
new_cases	0.409
icu_patients	0.929
icu_patients_per_million	0.540
hosp_patients	0.959
hosp_patients_per_million	0.249
weekly_icu_admissions	0.878
weekly_icu_admissions_per_million	0.871
weekly_hosp_admissions	1.000
weekly_hosp_admissions_per_million	0.652
total_tests	0.513
new_tests	0.696
total_tests_per_thousand	-0.021
new_tests_per_thousand	-0.039
new_tests_smoothed	0.758
new_tests_smoothed_per_thousand	0.029
positive_rate	0.207
tests_per_case	-0.261
total_vaccinations	0.456
people_vaccinated	0.520
people_fully_vaccinated	0.498
total_boosters	0.207
new_vaccinations	0.415
new_vaccinations_smoothed	0.446
total_vaccinations_per_hundred	-0.213
people_vaccinated_per_hundred	-0.194
people_fully_vaccinated_per_hundred	-0.200
total_boosters_per_hundred	-0.311
new_vaccinations_smoothed_per_million	-0.012
new_people_vaccinated_smoothed	0.397
new_people_vaccinated_smoothed_per_hundred	0.055
handwashing_facilities	NA
excess_mortality_cumulative_absolute	0.571
excess_mortality_cumulative	0.408
excess_mortality	0.367
excess_mortality_cumulative_per_million	0.203
	weekly_hosp_admissions_per_million
new_cases	0.363
icu_patients	0.581
icu_patients_per_million	0.723
hosp_patients	0.730
hosp_patients_per_million	0.759

weekly_icu_admissions	0.848
weekly_icu_admissions_per_million	0.871
weekly_hosp_admissions	0.652
weekly_hosp_admissions_per_million	1.000
total_tests	0.206
new_tests	0.418
total_tests_per_thousand	0.102
new_tests_per_thousand	0.192
new_tests_smoothed	0.496
new_tests_smoothed_per_thousand	0.284
positive_rate	0.500
tests_per_case	-0.461
total_vaccinations	0.057
people_vaccinated	0.083
people_fully_vaccinated	0.086
total_boosters	0.100
new_vaccinations	0.165
new_vaccinations_smoothed	0.175
total_vaccinations_per_hundred	-0.201
people_vaccinated_per_hundred	-0.280
people_fully_vaccinated_per_hundred	-0.214
total_boosters_per_hundred	-0.107
new_vaccinations_smoothed_per_million	0.018
new_people_vaccinated_smoothed	0.175
new_people_vaccinated_smoothed_per_hundred	0.048
handwashing_facilities	NA
excess_mortality_cumulative_absolute	0.130
excess_mortality_cumulative	0.199
excess_mortality	0.605
excess_mortality_cumulative_per_million	0.001

	total_tests	new_tests
new_cases	0.288	0.372
icu_patients	0.499	0.692
icu_patients_per_million	0.088	0.237
hosp_patients	0.525	0.701
hosp_patients_per_million	0.126	0.257
weekly_icu_admissions	-0.092	0.288
weekly_icu_admissions_per_million	-0.107	0.288
weekly_hosp_admissions	0.513	0.696
weekly_hosp_admissions_per_million	0.206	0.418
total_tests	1.000	0.612
new_tests	0.612	1.000
total_tests_per_thousand	0.507	0.345

new_tests_per_thousand	0.321	0.495
new_tests_smoothed	0.766	0.825
new_tests_smoothed_per_thousand	0.318	0.441
positive_rate	-0.085	-0.099
tests_per_case	-0.036	-0.058
total_vaccinations	0.747	0.372
people_vaccinated	0.710	0.383
people_fully_vaccinated	0.708	0.322
total_boosters	0.680	0.229
new_vaccinations	0.431	0.415
new_vaccinations_smoothed	0.490	0.455
total_vaccinations_per_hundred	0.238	0.074
people_vaccinated_per_hundred	0.237	0.082
people_fully_vaccinated_per_hundred	0.196	0.031
total_boosters_per_hundred	0.085	0.006
new_vaccinations_smoothed_per_million	-0.071	0.045
new_people_vaccinated_smoothed	0.362	0.429
new_people_vaccinated_smoothed_per_hundred	-0.103	0.007
handwashing_facilities	-0.030	-0.030
excess_mortality_cumulative_absolute	0.694	0.356
excess_mortality_cumulative	-0.048	-0.100
excess_mortality	-0.093	-0.071
excess_mortality_cumulative_per_million	0.232	0.089
	total_tests_per_thousand	
new_cases		0.238
icu_patients		0.023
icu_patients_per_million		-0.087
hosp_patients		0.085
hosp_patients_per_million		0.155
weekly_icu_admissions		-0.137
weekly_icu_admissions_per_million		-0.145
weekly_hosp_admissions		-0.021
weekly_hosp_admissions_per_million		0.102
total_tests		0.507
new_tests		0.345
total_tests_per_thousand		1.000
new_tests_per_thousand		0.708
new_tests_smoothed		0.418
new_tests_smoothed_per_thousand		0.748
positive_rate		0.000
tests_per_case		-0.015
total_vaccinations		0.072
people_vaccinated		0.016

people_fully_vaccinated	0.043
total_boosters	0.396
new_vaccinations	-0.095
new_vaccinations_smoothed	-0.069
total_vaccinations_per_hundred	0.565
people_vaccinated_per_hundred	0.472
people_fully_vaccinated_per_hundred	0.481
total_boosters_per_hundred	0.545
new_vaccinations_smoothed_per_million	0.000
new_people_vaccinated_smoothed	-0.117
new_people_vaccinated_smoothed_per_hundred	-0.173
handwashing_facilities	0.010
excess_mortality_cumulative_absolute	0.172
excess_mortality_cumulative	-0.165
excess_mortality	-0.171
excess_mortality_cumulative_per_million	0.120
	new_tests_per_thousand
new_cases	0.231
icu_patients	0.064
icu_patients_per_million	0.033
hosp_patients	0.104
hosp_patients_per_million	0.206
weekly_icu_admissions	0.249
weekly_icu_admissions_per_million	0.255
weekly_hosp_admissions	-0.039
weekly_hosp_admissions_per_million	0.192
total_tests	0.321
new_tests	0.495
total_tests_per_thousand	0.708
new_tests_per_thousand	1.000
new_tests_smoothed	0.509
new_tests_smoothed_per_thousand	0.954
positive_rate	-0.066
tests_per_case	0.003
total_vaccinations	-0.040
people_vaccinated	-0.069
people_fully_vaccinated	-0.060
total_boosters	0.124
new_vaccinations	-0.053
new_vaccinations_smoothed	-0.034
total_vaccinations_per_hundred	0.287
people_vaccinated_per_hundred	0.270
people_fully_vaccinated_per_hundred	0.225

total_boosters_per_hundred	0.236
new_vaccinations_smoothed_per_million	0.206
new_people_vaccinated_smoothed	-0.068
new_people_vaccinated_smoothed_per_hundred	0.014
handwashing_facilities	-0.003
excess_mortality_cumulative_absolute	-0.019
excess_mortality_cumulative	-0.174
excess_mortality	-0.135
excess_mortality_cumulative_per_million	-0.007
	new_tests_smoothed
new_cases	0.023
icu_patients	0.719
icu_patients_per_million	0.243
hosp_patients	0.741
hosp_patients_per_million	0.278
weekly_icu_admissions	0.302
weekly_icu_admissions_per_million	0.341
weekly_hosp_admissions	0.758
weekly_hosp_admissions_per_million	0.496
total_tests	0.766
new_tests	0.825
total_tests_per_thousand	0.418
new_tests_per_thousand	0.509
new_tests_smoothed	1.000
new_tests_smoothed_per_thousand	0.516
positive_rate	-0.166
tests_per_case	0.825
total_vaccinations	0.744
people_vaccinated	0.528
people_fully_vaccinated	0.596
total_boosters	0.648
new_vaccinations	0.730
new_vaccinations_smoothed	0.681
total_vaccinations_per_hundred	0.110
people_vaccinated_per_hundred	0.109
people_fully_vaccinated_per_hundred	0.087
total_boosters_per_hundred	0.031
new_vaccinations_smoothed_per_million	0.094
new_people_vaccinated_smoothed	0.509
new_people_vaccinated_smoothed_per_hundred	0.016
handwashing_facilities	-0.004
excess_mortality_cumulative_absolute	0.489
excess_mortality_cumulative	-0.094

excess_mortality	-0.052	
excess_mortality_cumulative_per_million	0.105	
	new_tests_smoothed_per_thousand	
new_cases		0.235
icu_patients		0.074
icu_patients_per_million		0.039
hosp_patients		0.116
hosp_patients_per_million		0.231
weekly_icu_admissions		0.232
weekly_icu_admissions_per_million		0.288
weekly_hosp_admissions		0.029
weekly_hosp_admissions_per_million		0.284
total_tests		0.318
new_tests		0.441
total_tests_per_thousand		0.748
new_tests_per_thousand		0.954
new_tests_smoothed		0.516
new_tests_smoothed_per_thousand		1.000
positive_rate	-0.111	
tests_per_case	0.375	
total_vaccinations	0.243	
people_vaccinated	-0.034	
people_fully_vaccinated	0.002	
total_boosters	0.152	
new_vaccinations	0.222	
new_vaccinations_smoothed	0.250	
total_vaccinations_per_hundred	0.312	
people_vaccinated_per_hundred	0.290	
people_fully_vaccinated_per_hundred	0.238	
total_boosters_per_hundred	0.261	
new_vaccinations_smoothed_per_million	0.235	
new_people_vaccinated_smoothed	0.105	
new_people_vaccinated_smoothed_per_hundred	0.031	
handwashing_facilities	0.073	
excess_mortality_cumulative_absolute	0.027	
excess_mortality_cumulative	-0.205	
excess_mortality	-0.138	
excess_mortality_cumulative_per_million	-0.013	
	positive_rate	tests_per_case
new_cases	0.204	-0.040
icu_patients	0.120	-0.116
icu_patients_per_million	0.368	-0.191
hosp_patients	0.187	-0.164

hosp_patients_per_million	0.360	-0.257
weekly_icu_admissions	0.265	-0.463
weekly_icu_admissions_per_million	0.246	-0.470
weekly_hosp_admissions	0.207	-0.261
weekly_hosp_admissions_per_million	0.500	-0.461
total_tests	-0.085	-0.036
new_tests	-0.099	-0.058
total_tests_per_thousand	0.000	-0.015
new_tests_per_thousand	-0.066	0.003
new_tests_smoothed	-0.166	0.825
new_tests_smoothed_per_thousand	-0.111	0.375
positive_rate	1.000	-0.132
tests_per_case	-0.132	1.000
total_vaccinations	-0.180	0.369
people_vaccinated	-0.134	0.198
people_fully_vaccinated	-0.121	0.365
total_boosters	0.084	0.159
new_vaccinations	-0.189	0.615
new_vaccinations_smoothed	-0.167	0.471
total_vaccinations_per_hundred	0.191	-0.016
people_vaccinated_per_hundred	0.103	0.022
people_fully_vaccinated_per_hundred	0.176	0.051
total_boosters_per_hundred	0.435	-0.017
new_vaccinations_smoothed_per_million	-0.032	0.048
new_people_vaccinated_smoothed	-0.156	0.525
new_people_vaccinated_smoothed_per_hundred	-0.100	0.055
handwashing_facilities	0.388	-0.191
excess_mortality_cumulative_absolute	0.117	-0.117
excess_mortality_cumulative	0.423	-0.181
excess_mortality	0.579	-0.126
excess_mortality_cumulative_per_million	0.284	-0.186
total_vaccinations people_vaccinated		
new_cases	0.161	0.036
icu_patients	0.303	0.383
icu_patients_per_million	-0.113	-0.070
hosp_patients	0.402	0.447
hosp_patients_per_million	-0.100	-0.109
weekly_icu_admissions	-0.252	-0.266
weekly_icu_admissions_per_million	-0.370	-0.394
weekly_hosp_admissions	0.456	0.520
weekly_hosp_admissions_per_million	0.057	0.083
total_tests	0.747	0.710
new_tests	0.372	0.383

total_tests_per_thousand	0.072	0.016
new_tests_per_thousand	-0.040	-0.069
new_tests_smoothed	0.744	0.528
new_tests_smoothed_per_thousand	0.243	-0.034
positive_rate	-0.180	-0.134
tests_per_case	0.369	0.198
total_vaccinations	1.000	0.988
people_vaccinated	0.988	1.000
people_fully_vaccinated	0.995	0.984
total_boosters	0.760	0.680
new_vaccinations	0.335	0.404
new_vaccinations_smoothed	0.355	0.445
total_vaccinations_per_hundred	0.259	0.124
people_vaccinated_per_hundred	0.242	0.194
people_fully_vaccinated_per_hundred	0.222	0.160
total_boosters_per_hundred	-0.105	-0.165
new_vaccinations_smoothed_per_million	-0.127	-0.142
new_people_vaccinated_smoothed	0.198	0.252
new_people_vaccinated_smoothed_per_hundred	-0.156	-0.133
handwashing_facilities	-0.037	-0.034
excess_mortality_cumulative_absolute	0.804	0.845
excess_mortality_cumulative	-0.100	-0.052
excess_mortality	-0.137	-0.110
excess_mortality_cumulative_per_million	0.228	0.242
	people_fully_vaccinated	
new_cases	0.023	
icu_patients	0.360	
icu_patients_per_million	-0.088	
hosp_patients	0.435	
hosp_patients_per_million	-0.099	
weekly_icu_admissions	-0.238	
weekly_icu_admissions_per_million	-0.361	
weekly_hosp_admissions	0.498	
weekly_hosp_admissions_per_million	0.086	
total_tests	0.708	
new_tests	0.322	
total_tests_per_thousand	0.043	
new_tests_per_thousand	-0.060	
new_tests_smoothed	0.596	
new_tests_smoothed_per_thousand	0.002	
positive_rate	-0.121	
tests_per_case	0.365	
total_vaccinations	0.995	

people_vaccinated	0.984	
people_fully_vaccinated	1.000	
total_boosters	0.708	
new_vaccinations	0.303	
new_vaccinations_smoothed	0.331	
total_vaccinations_per_hundred	0.142	
people_vaccinated_per_hundred	0.206	
people_fully_vaccinated_per_hundred	0.207	
total_boosters_per_hundred	-0.149	
new_vaccinations_smoothed_per_million	-0.179	
new_people_vaccinated_smoothed	0.115	
new_people_vaccinated_smoothed_per_hundred	-0.173	
handwashing_facilities	-0.236	
excess_mortality_cumulative_absolute	0.821	
excess_mortality_cumulative	-0.074	
excess_mortality	-0.109	
excess_mortality_cumulative_per_million	0.235	
	total_boosters	new_vaccinations
new_cases	0.068	0.020
icu_patients	0.037	0.493
icu_patients_per_million	-0.221	0.224
hosp_patients	0.246	0.437
hosp_patients_per_million	0.053	0.051
weekly_icu_admissions	-0.236	0.321
weekly_icu_admissions_per_million	-0.302	0.325
weekly_hosp_admissions	0.207	0.415
weekly_hosp_admissions_per_million	0.100	0.165
total_tests	0.680	0.431
new_tests	0.229	0.415
total_tests_per_thousand	0.396	-0.095
new_tests_per_thousand	0.124	-0.053
new_tests_smoothed	0.648	0.730
new_tests_smoothed_per_thousand	0.152	0.222
positive_rate	0.084	-0.189
tests_per_case	0.159	0.615
total_vaccinations	0.760	0.335
people_vaccinated	0.680	0.404
people_fully_vaccinated	0.708	0.303
total_boosters	1.000	0.049
new_vaccinations	0.049	1.000
new_vaccinations_smoothed	0.055	0.966
total_vaccinations_per_hundred	0.313	-0.100
people_vaccinated_per_hundred	0.256	-0.080

people_fully_vaccinated_per_hundred	0.296	-0.162
total_boosters_per_hundred	0.296	-0.278
new_vaccinations_smoothed_per_million	-0.268	0.321
new_people_vaccinated_smoothed	-0.111	0.829
new_people_vaccinated_smoothed_per_hundred	-0.249	0.194
handwashing_facilities	-0.104	0.000
excess_mortality_cumulative_absolute	0.414	0.242
excess_mortality_cumulative	-0.109	0.086
excess_mortality	-0.038	0.098
excess_mortality_cumulative_per_million	0.143	0.020
	new_vaccinations_smoothed	
new_cases		0.038
icu_patients		0.531
icu_patients_per_million		0.248
hosp_patients		0.471
hosp_patients_per_million		0.067
weekly_icu_admissions		0.344
weekly_icu_admissions_per_million		0.348
weekly_hosp_admissions		0.446
weekly_hosp_admissions_per_million		0.175
total_tests		0.490
new_tests		0.455
total_tests_per_thousand		-0.069
new_tests_per_thousand		-0.034
new_tests_smoothed		0.681
new_tests_smoothed_per_thousand		0.250
positive_rate		-0.167
tests_per_case		0.471
total_vaccinations		0.355
people_vaccinated		0.445
people_fully_vaccinated		0.331
total_boosters		0.055
new_vaccinations		0.966
new_vaccinations_smoothed		1.000
total_vaccinations_per_hundred		-0.088
people_vaccinated_per_hundred		-0.073
people_fully_vaccinated_per_hundred		-0.164
total_boosters_per_hundred		-0.285
new_vaccinations_smoothed_per_million		0.357
new_people_vaccinated_smoothed		0.853
new_people_vaccinated_smoothed_per_hundred		0.228
handwashing_facilities		0.036
excess_mortality_cumulative_absolute		0.274

excess_mortality_cumulative	-0.013
excess_mortality	0.044
excess_mortality_cumulative_per_million	-0.097
	total_vaccinations_per_hundred
new_cases	0.097
icu_patients	-0.229
icu_patients_per_million	-0.417
hosp_patients	-0.133
hosp_patients_per_million	-0.086
weekly_icu_admissions	-0.449
weekly_icu_admissions_per_million	-0.523
weekly_hosp_admissions	-0.213
weekly_hosp_admissions_per_million	-0.201
total_tests	0.238
new_tests	0.074
total_tests_per_thousand	0.565
new_tests_per_thousand	0.287
new_tests_smoothed	0.110
new_tests_smoothed_per_thousand	0.312
positive_rate	0.191
tests_per_case	-0.016
total_vaccinations	0.259
people_vaccinated	0.124
people_fully_vaccinated	0.142
total_boosters	0.313
new_vaccinations	-0.100
new_vaccinations_smoothed	-0.088
total_vaccinations_per_hundred	1.000
people_vaccinated_per_hundred	0.944
people_fully_vaccinated_per_hundred	0.961
total_boosters_per_hundred	0.886
new_vaccinations_smoothed_per_million	-0.228
new_people_vaccinated_smoothed	-0.197
new_people_vaccinated_smoothed_per_hundred	-0.461
handwashing_facilities	0.319
excess_mortality_cumulative_absolute	0.039
excess_mortality_cumulative	-0.306
excess_mortality	-0.258
excess_mortality_cumulative_per_million	0.012
	people_vaccinated_per_hundred
new_cases	0.085
icu_patients	-0.199
icu_patients_per_million	-0.400

hosp_patients	-0.127
hosp_patients_per_million	-0.183
weekly_icu_admissions	-0.507
weekly_icu_admissions_per_million	-0.581
weekly_hosp_admissions	-0.194
weekly_hosp_admissions_per_million	-0.280
total_tests	0.237
new_tests	0.082
total_tests_per_thousand	0.472
new_tests_per_thousand	0.270
new_tests_smoothed	0.109
new_tests_smoothed_per_thousand	0.290
positive_rate	0.103
tests_per_case	0.022
total_vaccinations	0.242
people_vaccinated	0.194
people_fully_vaccinated	0.206
total_boosters	0.256
new_vaccinations	-0.080
new_vaccinations_smoothed	-0.073
total_vaccinations_per_hundred	0.944
people_vaccinated_per_hundred	1.000
people_fully_vaccinated_per_hundred	0.967
total_boosters_per_hundred	0.623
new_vaccinations_smoothed_per_million	-0.051
new_people_vaccinated_smoothed	-0.203
new_people_vaccinated_smoothed_per_hundred	-0.345
handwashing_facilities	0.331
excess_mortality_cumulative_absolute	0.080
excess_mortality_cumulative	-0.235
excess_mortality	-0.283
excess_mortality_cumulative_per_million	0.059
people_fully_vaccinated_per_hundred	
new_cases	0.089
icu_patients	-0.206
icu_patients_per_million	-0.425
hosp_patients	-0.129
hosp_patients_per_million	-0.124
weekly_icu_admissions	-0.453
weekly_icu_admissions_per_million	-0.529
weekly_hosp_admissions	-0.200
weekly_hosp_admissions_per_million	-0.214
total_tests	0.196

new_tests	0.031
total_tests_per_thousand	0.481
new_tests_per_thousand	0.225
new_tests_smoothed	0.087
new_tests_smoothed_per_thousand	0.238
positive_rate	0.176
tests_per_case	0.051
total_vaccinations	0.222
people_vaccinated	0.160
people_fully_vaccinated	0.207
total_boosters	0.296
new_vaccinations	-0.162
new_vaccinations_smoothed	-0.164
total_vaccinations_per_hundred	0.961
people_vaccinated_per_hundred	0.967
people_fully_vaccinated_per_hundred	1.000
total_boosters_per_hundred	0.679
new_vaccinations_smoothed_per_million	-0.260
new_people_vaccinated_smoothed	-0.298
new_people_vaccinated_smoothed_per_hundred	-0.538
handwashing_facilities	0.076
excess_mortality_cumulative_absolute	0.040
excess_mortality_cumulative	-0.263
excess_mortality	-0.240
excess_mortality_cumulative_per_million	0.034
	total_boosters_per_hundred
new_cases	0.086
icu_patients	-0.296
icu_patients_per_million	-0.391
hosp_patients	-0.199
hosp_patients_per_million	0.079
weekly_icu_admissions	-0.383
weekly_icu_admissions_per_million	-0.418
weekly_hosp_admissions	-0.311
weekly_hosp_admissions_per_million	-0.107
total_tests	0.085
new_tests	0.006
total_tests_per_thousand	0.545
new_tests_per_thousand	0.236
new_tests_smoothed	0.031
new_tests_smoothed_per_thousand	0.261
positive_rate	0.435
tests_per_case	-0.017

total_vaccinations	-0.105
people_vaccinated	-0.165
people_fully_vaccinated	-0.149
total_boosters	0.296
new_vaccinations	-0.278
new_vaccinations_smoothed	-0.285
total_vaccinations_per_hundred	0.886
people_vaccinated_per_hundred	0.623
people_fully_vaccinated_per_hundred	0.679
total_boosters_per_hundred	1.000
new_vaccinations_smoothed_per_million	-0.407
new_people_vaccinated_smoothed	-0.326
new_people_vaccinated_smoothed_per_hundred	-0.461
handwashing_facilities	0.547
excess_mortality_cumulative_absolute	-0.122
excess_mortality_cumulative	-0.203
excess_mortality	-0.031
excess_mortality_cumulative_per_million	0.040
new_vaccinations_smoothed_per_million	
new_cases	0.004
icu_patients	0.063
icu_patients_per_million	0.207
hosp_patients	0.003
hosp_patients_per_million	0.020
weekly_icu_admissions	0.287
weekly_icu_admissions_per_million	0.310
weekly_hosp_admissions	-0.012
weekly_hosp_admissions_per_million	0.018
total_tests	-0.071
new_tests	0.045
total_tests_per_thousand	0.000
new_tests_per_thousand	0.206
new_tests_smoothed	0.094
new_tests_smoothed_per_thousand	0.235
positive_rate	-0.032
tests_per_case	0.048
total_vaccinations	-0.127
people_vaccinated	-0.142
people_fully_vaccinated	-0.179
total_boosters	-0.268
new_vaccinations	0.321
new_vaccinations_smoothed	0.357
total_vaccinations_per_hundred	-0.228

people_vaccinated_per_hundred	-0.051
people_fully_vaccinated_per_hundred	-0.260
total_boosters_per_hundred	-0.407
new_vaccinations_smoothed_per_million	1.000
new_people_vaccinated_smoothed	0.309
new_people_vaccinated_smoothed_per_hundred	0.746
handwashing_facilities	0.277
excess_mortality_cumulative_absolute	-0.170
excess_mortality_cumulative	-0.057
excess_mortality	0.026
excess_mortality_cumulative_per_million	-0.284
new_people_vaccinated_smoothed	
new_cases	0.025
icu_patients	0.497
icu_patients_per_million	0.293
hosp_patients	0.420
hosp_patients_per_million	0.098
weekly_icu_admissions	0.229
weekly_icu_admissions_per_million	0.276
weekly_hosp_admissions	0.397
weekly_hosp_admissions_per_million	0.175
total_tests	0.362
new_tests	0.429
total_tests_per_thousand	-0.117
new_tests_per_thousand	-0.068
new_tests_smoothed	0.509
new_tests_smoothed_per_thousand	0.105
positive_rate	-0.156
tests_per_case	0.525
total_vaccinations	0.198
people_vaccinated	0.252
people_fully_vaccinated	0.115
total_boosters	-0.111
new_vaccinations	0.829
new_vaccinations_smoothed	0.853
total_vaccinations_per_hundred	-0.197
people_vaccinated_per_hundred	-0.203
people_fully_vaccinated_per_hundred	-0.298
total_boosters_per_hundred	-0.326
new_vaccinations_smoothed_per_million	0.309
new_people_vaccinated_smoothed	1.000
new_people_vaccinated_smoothed_per_hundred	0.352
handwashing_facilities	0.017

excess_mortality_cumulative_absolute	0.180
excess_mortality_cumulative	0.044
excess_mortality	0.069
excess_mortality_cumulative_per_million	-0.085
	new_people_vaccinated_smoothed_per_hundred
new_cases	-0.030
icu_patients	0.127
icu_patients_per_million	0.318
hosp_patients	0.057
hosp_patients_per_million	0.069
weekly_icu_admissions	0.201
weekly_icu_admissions_per_million	0.254
weekly_hosp_admissions	0.055
weekly_hosp_admissions_per_million	0.048
total_tests	-0.103
new_tests	0.007
total_tests_per_thousand	-0.173
new_tests_per_thousand	0.014
new_tests_smoothed	0.016
new_tests_smoothed_per_thousand	0.031
positive_rate	-0.100
tests_per_case	0.055
total_vaccinations	-0.156
people_vaccinated	-0.133
people_fully_vaccinated	-0.173
total_boosters	-0.249
new_vaccinations	0.194
new_vaccinations_smoothed	0.228
total_vaccinations_per_hundred	-0.461
people_vaccinated_per_hundred	-0.345
people_fully_vaccinated_per_hundred	-0.538
total_boosters_per_hundred	-0.461
new_vaccinations_smoothed_per_million	0.746
new_people_vaccinated_smoothed	0.352
new_people_vaccinated_smoothed_per_hundred	1.000
handwashing_facilities	0.141
excess_mortality_cumulative_absolute	-0.114
excess_mortality_cumulative	0.042
excess_mortality	0.071
excess_mortality_cumulative_per_million	-0.192
	handwashing_facilities
new_cases	0.030
icu_patients	NA

icu_patients_per_million	NA
hosp_patients	NA
hosp_patients_per_million	NA
weekly_icu_admissions	NA
weekly_icu_admissions_per_million	NA
weekly_hosp_admissions	NA
weekly_hosp_admissions_per_million	NA
total_tests	-0.030
new_tests	-0.030
total_tests_per_thousand	0.010
new_tests_per_thousand	-0.003
new_tests_smoothed	-0.004
new_tests_smoothed_per_thousand	0.073
positive_rate	0.388
tests_per_case	-0.191
total_vaccinations	-0.037
people_vaccinated	-0.034
people_fully_vaccinated	-0.236
total_boosters	-0.104
new_vaccinations	0.000
new_vaccinations_smoothed	0.036
total_vaccinations_per_hundred	0.319
people_vaccinated_per_hundred	0.331
people_fully_vaccinated_per_hundred	0.076
total_boosters_per_hundred	0.547
new_vaccinations_smoothed_per_million	0.277
new_people_vaccinated_smoothed	0.017
new_people_vaccinated_smoothed_per_hundred	0.141
handwashing_facilities	1.000
excess_mortality_cumulative_absolute	0.283
excess_mortality_cumulative	0.479
excess_mortality	0.104
excess_mortality_cumulative_per_million	0.145
	excess_mortality_cumulative_absolute
new_cases	0.030
icu_patients	0.461
icu_patients_per_million	0.101
hosp_patients	0.498
hosp_patients_per_million	-0.035
weekly_icu_admissions	-0.478
weekly_icu_admissions_per_million	-0.471
weekly_hosp_admissions	0.571
weekly_hosp_admissions_per_million	0.130

total_tests	0.694
new_tests	0.356
total_tests_per_thousand	0.172
new_tests_per_thousand	-0.019
new_tests_smoothed	0.489
new_tests_smoothed_per_thousand	0.027
positive_rate	0.117
tests_per_case	-0.117
total_vaccinations	0.804
people_vaccinated	0.845
people_fully_vaccinated	0.821
total_boosters	0.414
new_vaccinations	0.242
new_vaccinations_smoothed	0.274
total_vaccinations_per_hundred	0.039
people_vaccinated_per_hundred	0.080
people_fully_vaccinated_per_hundred	0.040
total_boosters_per_hundred	-0.122
new_vaccinations_smoothed_per_million	-0.170
new_people_vaccinated_smoothed	0.180
new_people_vaccinated_smoothed_per_hundred	-0.114
handwashing_facilities	0.283
excess_mortality_cumulative_absolute	1.000
excess_mortality_cumulative	0.329
excess_mortality	0.013
excess_mortality_cumulative_per_million	0.664
excess_mortality_cumulative	
new_cases	-0.117
icu_patients	0.319
icu_patients_per_million	0.238
hosp_patients	0.347
hosp_patients_per_million	0.195
weekly_icu_admissions	-0.318
weekly_icu_admissions_per_million	-0.219
weekly_hosp_admissions	0.408
weekly_hosp_admissions_per_million	0.199
total_tests	-0.048
new_tests	-0.100
total_tests_per_thousand	-0.165
new_tests_per_thousand	-0.174
new_tests_smoothed	-0.094
new_tests_smoothed_per_thousand	-0.205
positive_rate	0.423

tests_per_case	-0.181
total_vaccinations	-0.100
people_vaccinated	-0.052
people_fully_vaccinated	-0.074
total_boosters	-0.109
new_vaccinations	0.086
new_vaccinations_smoothed	-0.013
total_vaccinations_per_hundred	-0.306
people_vaccinated_per_hundred	-0.235
people_fully_vaccinated_per_hundred	-0.263
total_boosters_per_hundred	-0.203
new_vaccinations_smoothed_per_million	-0.057
new_people_vaccinated_smoothed	0.044
new_people_vaccinated_smoothed_per_hundred	0.042
handwashing_facilities	0.479
excess_mortality_cumulative_absolute	0.329
excess_mortality_cumulative	1.000
excess_mortality	0.422
excess_mortality_cumulative_per_million	0.678
	excess_mortality
new_cases	-0.008
icu_patients	0.320
icu_patients_per_million	0.508
hosp_patients	0.349
hosp_patients_per_million	0.455
weekly_icu_admissions	0.446
weekly_icu_admissions_per_million	0.454
weekly_hosp_admissions	0.367
weekly_hosp_admissions_per_million	0.605
total_tests	-0.093
new_tests	-0.071
total_tests_per_thousand	-0.171
new_tests_per_thousand	-0.135
new_tests_smoothed	-0.052
new_tests_smoothed_per_thousand	-0.138
positive_rate	0.579
tests_per_case	-0.126
total_vaccinations	-0.137
people_vaccinated	-0.110
people_fully_vaccinated	-0.109
total_boosters	-0.038
new_vaccinations	0.098
new_vaccinations_smoothed	0.044

total_vaccinations_per_hundred	-0.258
people_vaccinated_per_hundred	-0.283
people_fully_vaccinated_per_hundred	-0.240
total_boosters_per_hundred	-0.031
new_vaccinations_smoothed_per_million	0.026
new_people_vaccinated_smoothed	0.069
new_people_vaccinated_smoothed_per_hundred	0.071
handwashing_facilities	0.104
excess_mortality_cumulative_absolute	0.013
excess_mortality_cumulative	0.422
excess_mortality	1.000
excess_mortality_cumulative_per_million	0.062
	excess_mortality_cumulative_per_million
new_cases	-0.064
icu_patients	0.143
icu_patients_per_million	0.005
hosp_patients	0.178
hosp_patients_per_million	0.028
weekly_icu_admissions	-0.503
weekly_icu_admissions_per_million	-0.470
weekly_hosp_admissions	0.203
weekly_hosp_admissions_per_million	0.001
total_tests	0.232
new_tests	0.089
total_tests_per_thousand	0.120
new_tests_per_thousand	-0.007
new_tests_smoothed	0.105
new_tests_smoothed_per_thousand	-0.013
positive_rate	0.284
tests_per_case	-0.186
total_vaccinations	0.228
people_vaccinated	0.242
people_fully_vaccinated	0.235
total_boosters	0.143
new_vaccinations	0.020
new_vaccinations_smoothed	-0.097
total_vaccinations_per_hundred	0.012
people_vaccinated_per_hundred	0.059
people_fully_vaccinated_per_hundred	0.034
total_boosters_per_hundred	0.040
new_vaccinations_smoothed_per_million	-0.284
new_people_vaccinated_smoothed	-0.085
new_people_vaccinated_smoothed_per_hundred	-0.192

handwashing_facilities	0.145
excess_mortality_cumulative_absolute	0.664
excess_mortality_cumulative	0.678
excess_mortality	0.062
excess_mortality_cumulative_per_million	1.000

```
[1] "total_tests"      "new_tests"        "positive_rate"
[4] "total_vaccinations"
```

Number of observations with hosp_patients missingness by country

Italy	Australia	Canada	United Kingdom	United States
52	88	90	152	200
France	South Africa	Japan	South Korea	China
241	519	1174	1216	1350
Colombia	Ecuador	Ethiopia	Germany	Morocco
1350	1350	1350	1350	1350
Pakistan	Philippines	Russia	Saudi Arabia	Sri Lanka
1350	1350	1350	1350	1350
Turkey	Mexico	India	Argentina	
1350	1352	1356	1357	

Number of observations with icu_patients missingness by country

Italy	Australia	Canada	Germany	United States
52	88	90	156	200
France	South Korea	South Africa	United Kingdom	Argentina
241	284	477	569	710
Japan	China	Colombia	Ecuador	Ethiopia
1175	1350	1350	1350	1350
Morocco	Pakistan	Philippines	Russia	Saudi Arabia
1350	1350	1350	1350	1350
Sri Lanka	Turkey	Mexico	India	
1350	1350	1352	1356	

Remove multicollinearity predictors

```
total_cases new_cases new_cases_smoothed
```

total_cases	1.000	0.155	0.191
new_cases	0.155	1.000	0.870
new_cases_smoothed	0.191	0.870	1.000
total_deaths	0.785	0.096	0.109
new_deaths	0.186	0.315	0.300
new_deaths_smoothed	0.223	0.241	0.307
total_cases_per_million	0.539	0.055	0.064
new_cases_per_million	0.071	0.478	0.206
new_cases_smoothed_per_million	0.144	0.357	0.402
total_deaths_per_million	0.401	0.026	0.030
new_deaths_per_million	-0.011	0.131	0.059
new_deaths_smoothed_per_million	-0.017	0.079	0.094
reproduction_rate	-0.088	0.007	-0.001
total_tests	0.860	0.288	0.438
new_tests	0.545	0.372	0.529
positive_rate	0.015	0.204	0.248
total_vaccinations	0.301	0.161	0.177
stringency_index	-0.318	-0.007	-0.011
population_density	0.067	0.023	0.025
median_age	0.221	0.076	0.084
aged_65_older	0.213	0.064	0.071
aged_70_older	0.199	0.059	0.065
gdp_per_capita	0.262	0.063	0.070
extreme_poverty	-0.019	-0.024	-0.025
cardiovasc_death_rate	-0.089	-0.024	-0.027
diabetes_prevalence	0.070	0.013	0.015
female_smokers	0.250	0.050	0.056
male_smokers	0.060	0.043	0.048
hospital_beds_per_thousand	0.089	0.048	0.053
life_expectancy	0.123	0.046	0.051
human_development_index	0.194	0.053	0.059
population	0.317	0.106	0.118
total_deaths new_deaths new_deaths_smoothed			
total_cases	0.785	0.186	0.223
new_cases	0.096	0.315	0.241
new_cases_smoothed	0.109	0.300	0.307
total_deaths	1.000	0.292	0.347
new_deaths	0.292	1.000	0.853
new_deaths_smoothed	0.347	0.853	1.000
total_cases_per_million	0.296	-0.027	-0.029
new_cases_per_million	0.029	0.213	0.087
new_cases_smoothed_per_million	0.056	0.164	0.179
total_deaths_per_million	0.562	0.062	0.077

new_deaths_per_million	0.040	0.564	0.306
new_deaths_smoothed_per_million	0.076	0.469	0.549
reproduction_rate	-0.082	-0.035	-0.058
total_tests	0.799	0.317	0.374
new_tests	0.553	0.452	0.515
positive_rate	0.044	0.166	0.171
total_vaccinations	0.256	0.017	0.015
stringency_index	-0.238	0.183	0.210
population_density	-0.068	-0.037	-0.043
median_age	0.079	0.066	0.077
aged_65_older	0.100	0.073	0.086
aged_70_older	0.093	0.068	0.079
gdp_per_capita	0.219	0.136	0.160
extreme_poverty	0.029	0.001	0.001
cardiovasc_death_rate	-0.017	-0.005	-0.006
diabetes_prevalence	0.154	0.082	0.095
female_smokers	0.269	0.158	0.185
male_smokers	-0.057	-0.008	-0.009
hospital_beds_per_thousand	-0.091	-0.028	-0.033
life_expectancy	-0.023	-0.001	-0.001
human_development_index	0.135	0.088	0.103
population	0.243	0.151	0.177
	total_cases_per_million	new_cases_per_million	
total_cases		0.539	0.071
new_cases		0.055	0.478
new_cases_smoothed		0.064	0.206
total_deaths		0.296	0.029
new_deaths		-0.027	0.213
new_deaths_smoothed		-0.029	0.087
total_cases_per_million		1.000	0.155
new_cases_per_million		0.155	1.000
new_cases_smoothed_per_million		0.302	0.520
total_deaths_per_million		0.578	0.072
new_deaths_per_million		-0.011	0.247
new_deaths_smoothed_per_million		-0.018	0.133
reproduction_rate		-0.118	0.024
total_tests		0.444	0.092
new_tests		0.246	0.103
positive_rate		0.229	0.235
total_vaccinations		-0.138	-0.040
stringency_index		-0.554	-0.061
population_density		0.047	0.040
median_age		0.398	0.138

aged_65_older	0.406	0.136
aged_70_older	0.408	0.136
gdp_per_capita	0.382	0.125
extreme_poverty	-0.248	-0.099
cardiovasc_death_rate	-0.329	-0.108
diabetes_prevalence	-0.239	-0.077
female_smokers	0.455	0.129
male_smokers	0.033	0.020
hospital_beds_per_thousand	0.279	0.116
life_expectancy	0.388	0.133
human_development_index	0.414	0.133
population	-0.161	-0.044
new_cases_smoothed_per_million		
total_cases	0.144	
new_cases	0.357	
new_cases_smoothed	0.402	
total_deaths	0.056	
new_deaths	0.164	
new_deaths_smoothed	0.179	
total_cases_per_million	0.302	
new_cases_per_million	0.520	
new_cases_smoothed_per_million	1.000	
total_deaths_per_million	0.141	
new_deaths_per_million	0.158	
new_deaths_smoothed_per_million	0.264	
reproduction_rate	0.014	
total_tests	0.183	
new_tests	0.237	
positive_rate	0.406	
total_vaccinations	-0.079	
stringency_index	-0.124	
population_density	0.077	
median_age	0.265	
aged_65_older	0.261	
aged_70_older	0.260	
gdp_per_capita	0.239	
extreme_poverty	-0.144	
cardiovasc_death_rate	-0.207	
diabetes_prevalence	-0.147	
female_smokers	0.248	
male_smokers	0.038	
hospital_beds_per_thousand	0.223	
life_expectancy	0.254	

human_development_index	0.255	
population	-0.084	
	total_deaths_per_million	new_deaths_per_million
total_cases	0.401	-0.011
new_cases	0.026	0.131
new_cases_smoothed	0.030	0.059
total_deaths	0.562	0.040
new_deaths	0.062	0.564
new_deaths_smoothed	0.077	0.306
total_cases_per_million	0.578	-0.011
new_cases_per_million	0.072	0.247
new_cases_smoothed_per_million	0.141	0.158
total_deaths_per_million	1.000	0.062
new_deaths_per_million	0.062	1.000
new_deaths_smoothed_per_million	0.118	0.561
reproduction_rate	-0.161	-0.021
total_tests	0.339	0.026
new_tests	0.226	0.049
positive_rate	0.223	0.218
total_vaccinations	-0.252	-0.087
stringency_index	-0.472	0.144
population_density	-0.274	-0.069
median_age	0.213	0.077
aged_65_older	0.256	0.088
aged_70_older	0.267	0.090
gdp_per_capita	0.210	0.076
extreme_poverty	-0.222	-0.075
cardiovasc_death_rate	-0.262	-0.074
diabetes_prevalence	-0.210	-0.063
female_smokers	0.471	0.141
male_smokers	-0.131	-0.025
hospital_beds_per_thousand	-0.036	0.009
life_expectancy	0.189	0.065
human_development_index	0.318	0.102
population	-0.233	-0.064
	new_deaths_smoothed_per_million	
total_cases	-0.017	
new_cases	0.079	
new_cases_smoothed	0.094	
total_deaths	0.076	
new_deaths	0.469	
new_deaths_smoothed	0.549	
total_cases_per_million	-0.018	

new_cases_per_million	0.133		
new_cases_smoothed_per_million	0.264		
total_deaths_per_million	0.118		
new_deaths_per_million	0.561		
new_deaths_smoothed_per_million	1.000		
reproduction_rate	-0.060		
total_tests	0.053		
new_tests	0.113		
positive_rate	0.367		
total_vaccinations	-0.172		
stringency_index	0.255		
population_density	-0.124		
median_age	0.139		
aged_65_older	0.158		
aged_70_older	0.162		
gdp_per_capita	0.136		
extreme_poverty	-0.122		
cardiovasc_death_rate	-0.134		
diabetes_prevalence	-0.113		
female_smokers	0.254		
male_smokers	-0.046		
hospital_beds_per_thousand	0.017		
life_expectancy	0.118		
human_development_index	0.184		
population	-0.114		
	reproduction_rate	total_tests	new_tests
total_cases	-0.088	0.860	0.545
new_cases	0.007	0.288	0.372
new_cases_smoothed	-0.001	0.438	0.529
total_deaths	-0.082	0.799	0.553
new_deaths	-0.035	0.317	0.452
new_deaths_smoothed	-0.058	0.374	0.515
total_cases_per_million	-0.118	0.444	0.246
new_cases_per_million	0.024	0.092	0.103
new_cases_smoothed_per_million	0.014	0.183	0.237
total_deaths_per_million	-0.161	0.339	0.226
new_deaths_per_million	-0.021	0.026	0.049
new_deaths_smoothed_per_million	-0.060	0.053	0.113
reproduction_rate	1.000	-0.052	-0.012
total_tests	-0.052	1.000	0.612
new_tests	-0.012	0.612	1.000
positive_rate	0.040	-0.085	-0.099
total_vaccinations	0.024	0.747	0.372

stringency_index	0.159	-0.185	-0.017
population_density	0.026	0.099	0.126
median_age	0.082	0.102	0.126
aged_65_older	0.086	0.110	0.137
aged_70_older	0.086	0.102	0.131
gdp_per_capita	0.073	0.187	0.195
extreme_poverty	0.004	0.107	0.105
cardiovasc_death_rate	-0.034	-0.009	-0.023
diabetes_prevalence	-0.052	0.082	0.049
female_smokers	0.055	0.206	0.240
male_smokers	0.000	-0.044	-0.034
hospital_beds_per_thousand	0.058	-0.082	-0.068
life_expectancy	0.057	0.010	0.029
human_development_index	0.061	0.092	0.107
population	0.012	0.486	0.465
positive_rate total_vaccinations			
total_cases	0.015	0.301	
new_cases	0.204	0.161	
new_cases_smoothed	0.248	0.177	
total_deaths	0.044	0.256	
new_deaths	0.166	0.017	
new_deaths_smoothed	0.171	0.015	
total_cases_per_million	0.229	-0.138	
new_cases_per_million	0.235	-0.040	
new_cases_smoothed_per_million	0.406	-0.079	
total_deaths_per_million	0.223	-0.252	
new_deaths_per_million	0.218	-0.087	
new_deaths_smoothed_per_million	0.367	-0.172	
reproduction_rate	0.040	0.024	
total_tests	-0.085	0.747	
new_tests	-0.099	0.372	
positive_rate	1.000	-0.180	
total_vaccinations	-0.180	1.000	
stringency_index	-0.009	0.187	
population_density	-0.178	0.228	
median_age	-0.158	-0.064	
aged_65_older	-0.096	-0.162	
aged_70_older	-0.083	-0.190	
gdp_per_capita	-0.146	-0.247	
extreme_poverty	-0.013	0.230	
cardiovasc_death_rate	-0.148	0.266	
diabetes_prevalence	-0.030	0.263	
female_smokers	-0.022	-0.297	

male_smokers	-0.222	0.181	
hospital_beds_per_thousand	-0.087	-0.116	
life_expectancy	-0.034	-0.198	
human_development_index	-0.027	-0.277	
population	-0.179	0.847	
	stringency_index	population_density	median_age
total_cases	-0.318	0.067	0.221
new_cases	-0.007	0.023	0.076
new_cases_smoothed	-0.011	0.025	0.084
total_deaths	-0.238	-0.068	0.079
new_deaths	0.183	-0.037	0.066
new_deaths_smoothed	0.210	-0.043	0.077
total_cases_per_million	-0.554	0.047	0.398
new_cases_per_million	-0.061	0.040	0.138
new_cases_smoothed_per_million	-0.124	0.077	0.265
total_deaths_per_million	-0.472	-0.274	0.213
new_deaths_per_million	0.144	-0.069	0.077
new_deaths_smoothed_per_million	0.255	-0.124	0.139
reproduction_rate	0.159	0.026	0.082
total_tests	-0.185	0.099	0.102
new_tests	-0.017	0.126	0.126
positive_rate	-0.009	-0.178	-0.158
total_vaccinations	0.187	0.228	-0.064
stringency_index	1.000	0.023	-0.063
population_density	0.023	1.000	0.159
median_age	-0.063	0.159	1.000
aged_65_older	-0.085	0.152	0.930
aged_70_older	-0.093	0.141	0.915
gdp_per_capita	-0.121	-0.136	0.761
extreme_poverty	-0.004	0.127	-0.629
cardiovasc_death_rate	0.114	-0.008	-0.498
diabetes_prevalence	0.031	-0.076	-0.269
female_smokers	-0.121	-0.151	0.643
male_smokers	0.034	0.183	0.224
hospital_beds_per_thousand	-0.118	0.335	0.729
life_expectancy	-0.057	0.071	0.841
human_development_index	-0.098	-0.060	0.855
population	0.205	0.274	-0.073
	aged_65_older	aged_70_older	gdp_per_capita
total_cases	0.213	0.199	0.262
new_cases	0.064	0.059	0.063
new_cases_smoothed	0.071	0.065	0.070
total_deaths	0.100	0.093	0.219

new_deaths	0.073	0.068	0.136
new_deaths_smoothed	0.086	0.079	0.160
total_cases_per_million	0.406	0.408	0.382
new_cases_per_million	0.136	0.136	0.125
new_cases_smoothed_per_million	0.261	0.260	0.239
total_deaths_per_million	0.256	0.267	0.210
new_deaths_per_million	0.088	0.090	0.076
new_deaths_smoothed_per_million	0.158	0.162	0.136
reproduction_rate	0.086	0.086	0.073
total_tests	0.110	0.102	0.187
new_tests	0.137	0.131	0.195
positive_rate	-0.096	-0.083	-0.146
total_vaccinations	-0.162	-0.190	-0.247
stringency_index	-0.085	-0.093	-0.121
population_density	0.152	0.141	-0.136
median_age	0.930	0.915	0.761
aged_65_older	1.000	0.995	0.690
aged_70_older	0.995	1.000	0.686
gdp_per_capita	0.690	0.686	1.000
extreme_poverty	-0.552	-0.525	-0.521
cardiovasc_death_rate	-0.537	-0.518	-0.523
diabetes_prevalence	-0.460	-0.462	0.054
female_smokers	0.718	0.743	0.624
male_smokers	0.104	0.099	-0.038
hospital_beds_per_thousand	0.671	0.658	0.476
life_expectancy	0.797	0.775	0.721
human_development_index	0.767	0.750	0.881
population	-0.152	-0.178	-0.248
extreme_poverty cardiovasc_death_rate			
total_cases	-0.019	-0.089	
new_cases	-0.024	-0.024	
new_cases_smoothed	-0.025	-0.027	
total_deaths	0.029	-0.017	
new_deaths	0.001	-0.005	
new_deaths_smoothed	0.001	-0.006	
total_cases_per_million	-0.248	-0.329	
new_cases_per_million	-0.099	-0.108	
new_cases_smoothed_per_million	-0.144	-0.207	
total_deaths_per_million	-0.222	-0.262	
new_deaths_per_million	-0.075	-0.074	
new_deaths_smoothed_per_million	-0.122	-0.134	
reproduction_rate	0.004	-0.034	
total_tests	0.107	-0.009	

new_tests	0.105	-0.023	
positive_rate	-0.013	-0.148	
total_vaccinations	0.230	0.266	
stringency_index	-0.004	0.114	
population_density	0.127	-0.008	
median_age	-0.629	-0.498	
aged_65_older	-0.552	-0.537	
aged_70_older	-0.525	-0.518	
gdp_per_capita	-0.521	-0.523	
extreme_poverty	1.000	0.070	
cardiovasc_death_rate	0.070	1.000	
diabetes_prevalence	0.015	0.193	
female_smokers	-0.407	-0.296	
male_smokers	-0.369	0.548	
hospital_beds_per_thousand	-0.421	-0.320	
life_expectancy	-0.741	-0.631	
human_development_index	-0.705	-0.579	
population	0.278	0.242	
	diabetes_prevalence	female_smokers	male_smokers
total_cases	0.070	0.250	0.060
new_cases	0.013	0.050	0.043
new_cases_smoothed	0.015	0.056	0.048
total_deaths	0.154	0.269	-0.057
new_deaths	0.082	0.158	-0.008
new_deaths_smoothed	0.095	0.185	-0.009
total_cases_per_million	-0.239	0.455	0.033
new_cases_per_million	-0.077	0.129	0.020
new_cases_smoothed_per_million	-0.147	0.248	0.038
total_deaths_per_million	-0.210	0.471	-0.131
new_deaths_per_million	-0.063	0.141	-0.025
new_deaths_smoothed_per_million	-0.113	0.254	-0.046
reproduction_rate	-0.052	0.055	0.000
total_tests	0.082	0.206	-0.044
new_tests	0.049	0.240	-0.034
positive_rate	-0.030	-0.022	-0.222
total_vaccinations	0.263	-0.297	0.181
stringency_index	0.031	-0.121	0.034
population_density	-0.076	-0.151	0.183
median_age	-0.269	0.643	0.224
aged_65_older	-0.460	0.718	0.104
aged_70_older	-0.462	0.743	0.099
gdp_per_capita	0.054	0.624	-0.038
extreme_poverty	0.015	-0.407	-0.369

cardiovasc_death_rate	0.193	-0.296	0.548
diabetes_prevalence	1.000	-0.372	-0.035
female_smokers	-0.372	1.000	0.221
male_smokers	-0.035	0.221	1.000
hospital_beds_per_thousand	-0.243	0.402	0.410
life_expectancy	-0.213	0.471	-0.029
human_development_index	-0.127	0.656	0.064
population	0.229	-0.257	0.143
	hospital_beds_per_thousand	life_expectancy	
total_cases	0.089	0.123	
new_cases	0.048	0.046	
new_cases_smoothed	0.053	0.051	
total_deaths	-0.091	-0.023	
new_deaths	-0.028	-0.001	
new_deaths_smoothed	-0.033	-0.001	
total_cases_per_million	0.279	0.388	
new_cases_per_million	0.116	0.133	
new_cases_smoothed_per_million	0.223	0.254	
total_deaths_per_million	-0.036	0.189	
new_deaths_per_million	0.009	0.065	
new_deaths_smoothed_per_million	0.017	0.118	
reproduction_rate	0.058	0.057	
total_tests	-0.082	0.010	
new_tests	-0.068	0.029	
positive_rate	-0.087	-0.034	
total_vaccinations	-0.116	-0.198	
stringency_index	-0.118	-0.057	
population_density	0.335	0.071	
median_age	0.729	0.841	
aged_65_older	0.671	0.797	
aged_70_older	0.658	0.775	
gdp_per_capita	0.476	0.721	
extreme_poverty	-0.421	-0.741	
cardiovasc_death_rate	-0.320	-0.631	
diabetes_prevalence	-0.243	-0.213	
female_smokers	0.402	0.471	
male_smokers	0.410	-0.029	
hospital_beds_per_thousand	1.000	0.544	
life_expectancy	0.544	1.000	
human_development_index	0.580	0.855	
population	-0.129	-0.229	
	human_development_index	population	
total_cases	0.194	0.317	

new_cases	0.053	0.106
new_cases_smoothed	0.059	0.118
total_deaths	0.135	0.243
new_deaths	0.088	0.151
new_deaths_smoothed	0.103	0.177
total_cases_per_million	0.414	-0.161
new_cases_per_million	0.133	-0.044
new_cases_smoothed_per_million	0.255	-0.084
total_deaths_per_million	0.318	-0.233
new_deaths_per_million	0.102	-0.064
new_deaths_smoothed_per_million	0.184	-0.114
reproduction_rate	0.061	0.012
total_tests	0.092	0.486
new_tests	0.107	0.465
positive_rate	-0.027	-0.179
total_vaccinations	-0.277	0.847
stringency_index	-0.098	0.205
population_density	-0.060	0.274
median_age	0.855	-0.073
aged_65_older	0.767	-0.152
aged_70_older	0.750	-0.178
gdp_per_capita	0.881	-0.248
extreme_poverty	-0.705	0.278
cardiovasc_death_rate	-0.579	0.242
diabetes_prevalence	-0.127	0.229
female_smokers	0.656	-0.257
male_smokers	0.064	0.143
hospital_beds_per_thousand	0.580	-0.129
life_expectancy	0.855	-0.229
human_development_index	1.000	-0.274
population	-0.274	1.000

The predictors with multicollinearity issues.

[1] "iso_code"	"median_age"
[3] "aged_65_older"	"aged_70_older"
[5] "human_development_index"	"new_cases_smoothed"
[7] "new_deaths_smoothed"	"new_deaths_smoothed_per_million"
[9] "new_cases_smoothed_per_million"	

Final dataset

The number of observations and variables in the final dataset.

```
[1] 32416    29
```

```
[1] "continent"          "location"
[3] "date"               "total_cases"
[5] "new_cases"          "total_deaths"
[7] "new_deaths"         "total_cases_per_million"
[9] "new_cases_per_million" "total_deaths_per_million"
[11] "new_deaths_per_million" "reproduction_rate"
[13] "total_tests"        "new_tests"
[15] "positive_rate"      "total_vaccinations"
[17] "stringency_index"   "population_density"
[19] "gdp_per_capita"     "extreme_poverty"
[21] "cardiovasc_death_rate" "diabetes_prevalence"
[23] "female_smokers"      "male_smokers"
[25] "hospital_beds_per_thousand" "life_expectancy"
[27] "population"         "G20"
[29] "G24"
```