

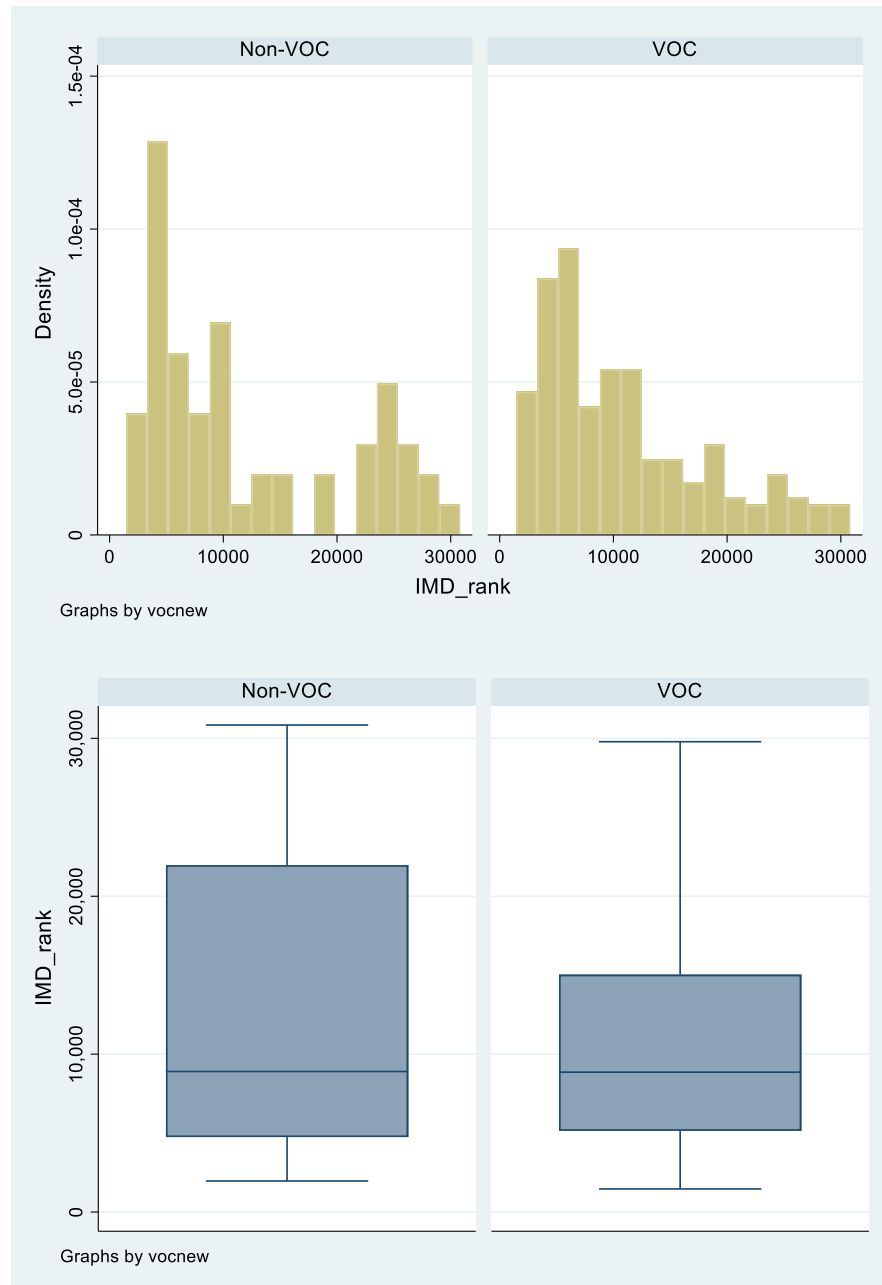
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1. Summary of IMD_rank at household-level, by VOC exposure

```
. table vocnew if n1==1, c(median imd_rank p25 imd_rank p75 imd_rank n imd_rank)
```

| vocnew | med(imd_rank) | p25(imd_rank) | p75(imd_rank) | N(imd_rank) |
|---------|---------------|---------------|---------------|-------------|
| Non-VOC | 8899 | 4748 | 21971 | 55 |
| VOC | 8860 | 5146 | 15029 | 221 |



2. Summary of potential confounders by (i) VOC status and (ii) nc_pos

```

-----
-----
name: <unnamed>
log: C:\Users\eidekfie\research\covid\UK\data\202206\datasummary-20220607.log
log type: text
opened on: 7 Jun 2022, 11:45:25

. xtset hh_id
panel variable: hh_id (unbalanced)

. * data summaries
. * note cont vars: agenew, dayshh, diffpcrsero
. foreach var in sexnew imdnew isolatenew close_contact diffpcrsero_cat3 dayshh_cat {
2.
.     tab `var' vocnew, col nokey
3.     tab `var' nc_pos, row nokey
4.     xtlogit nc_pos 1.`var', re or nolog
5.     quadchk, nooutput
6. }

-----
sexnew |          vocnew          |      Total
-----+-----+-----
      | Non-VOC      VOC |
-----+-----+-----
male  |          45      148 |          193
      |      44.12     42.05 |          42.51
-----+-----+-----
female |          57      204 |          261
      |      55.88     57.95 |          57.49
-----+-----+-----
Total |          102     352 |          454
      |      100.00    100.00 |          100.00
-----

sexnew |          NC_pos          |      Total
-----+-----+-----
      |      Neg      Pos |
-----+-----+-----
male  |          43      150 |          193
      |      22.28     77.72 |          100.00
-----+-----+-----
female |          59      202 |          261
      |      22.61     77.39 |          100.00
-----+-----+-----
Total |          102     352 |          454
      |      22.47     77.53 |          100.00
-----

Random-effects logistic regression
Group variable: hh_id
Number of obs      =          454
Number of groups   =          276

Random effects u_i ~ Gaussian
Obs per group:
min =          1
avg  =          1.6
max  =          7

Integration method: mvaghermite
Integration pts.   =          12

Log likelihood = -235.48501
Wald chi2(1)      =          0.07
Prob > chi2       =          0.7859

-----
nc_pos | Odds Ratio  Std. Err.    z    P>|z|    [95% Conf. Interval]
-----+-----+-----+-----+-----+-----
sexnew |
female |      .922787  .2729933   -0.27  0.786    .5167562    1.647848
_cons  |      5.847051  1.841601    5.61  0.000    3.153846    10.8401
-----+-----+-----+-----+-----+-----
/lnsig2u |      .8131777  .5141728
-----+-----+-----+-----+-----+-----
sigma_u |      1.501687  .3860632
rho     |      .406689  .1240663
-----+-----+-----+-----+-----+-----
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 12.76
Prob >= chibar2 = 0.000

```

Refitting model intpoints() = 8
 Refitting model intpoints() = 16

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|----------------|--------------------------------|-----------------------------------|------------------------------------|---------------------|
| Log likelihood | -235.48501 | -235.49215 | -235.48515 | |
| | | -.00713367 | -.0001428 | Difference |
| | | .00003029 | 6.064e-07 | Relative difference |
| nc_pos: | -.0803568 | -.08055042 | -.08034954 | |
| l.sexnew | | -.00019362 | 7.261e-06 | Difference |
| | | .00240952 | -.00009036 | Relative difference |
| nc_pos: | 1.7659374 | 1.7674262 | 1.7657873 | |
| _cons | | .0014888 | -.00015006 | Difference |
| | | .00084307 | -.00008498 | Relative difference |
| /: | .81317773 | .81656234 | .81289198 | |
| lnsig2u | | .00338462 | -.00028575 | Difference |
| | | .00416221 | -.0003514 | Relative difference |

| imdnew | vocnew | | Total |
|--------|---------|--------|--------|
| | Non-VOC | VOC | |
| 1st | 29 | 43 | 72 |
| | 28.43 | 12.22 | 15.86 |
| 2nd | 3 | 34 | 37 |
| | 2.94 | 9.66 | 8.15 |
| 3rd | 44 | 194 | 238 |
| | 43.14 | 55.11 | 52.42 |
| 4th | 26 | 81 | 107 |
| | 25.49 | 23.01 | 23.57 |
| Total | 102 | 352 | 454 |
| | 100.00 | 100.00 | 100.00 |

| imdnew | NC_pos | | Total |
|--------|--------|-------|--------|
| | Neg | Pos | |
| 1st | 21 | 51 | 72 |
| | 29.17 | 70.83 | 100.00 |
| 2nd | 4 | 33 | 37 |
| | 10.81 | 89.19 | 100.00 |
| 3rd | 51 | 187 | 238 |
| | 21.43 | 78.57 | 100.00 |
| 4th | 26 | 81 | 107 |
| | 24.30 | 75.70 | 100.00 |
| Total | 102 | 352 | 454 |
| | 22.47 | 77.53 | 100.00 |

Random-effects logistic regression
 Group variable: hh_id

Number of obs = 454
 Number of groups = 276

Random effects u_i ~ Gaussian

Obs per group:
 min = 1
 avg = 1.6
 max = 7

Integration method: mvaghermite

Integration pts. = 12

Log likelihood = -233.38742

Wald chi2(3) = 3.88
 Prob > chi2 = 0.2750

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------|------------|-----------|------|-------|----------------------|----------|
| ----- | | | | | | |
| imdnew | | | | | | |
| 2nd | 4.341703 | 3.469031 | 1.84 | 0.066 | .9068767 | 20.78606 |
| 3rd | 1.745245 | .8219964 | 1.18 | 0.237 | .6933421 | 4.393043 |
| 4th | 1.303409 | .6799066 | 0.51 | 0.611 | .4688807 | 3.623257 |
| _cons | 3.435517 | 1.479133 | 2.87 | 0.004 | 1.477455 | 7.988586 |
| ----- | | | | | | |
| /lnsig2u | .7423675 | .5314732 | | | -.2993009 | 1.784036 |
| ----- | | | | | | |
| sigma_u | 1.449449 | .3851718 | | | .8610089 | 2.440048 |
| rho | .3897222 | .126405 | | | .1838995 | .6440964 |
| ----- | | | | | | |

Note: Estimates are transformed only in the first equation.

Note: _cons estimates baseline odds (conditional on zero random effects).

LR test of rho=0: chibar2(01) = 11.48 Prob >= chibar2 = 0.000

Refitting model intpoints() = 8

Refitting model intpoints() = 16

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|---------------------|--------------------------------|-----------------------------------|------------------------------------|---------------------|
| ----- | | | | |
| Log likelihood | -233.38742 | -233.39197 | -233.38751 | |
| | | -.00454226 | -.00008313 | Difference |
| | | .00001946 | 3.562e-07 | Relative difference |
| ----- | | | | |
| nc_pos: 1.imdnew | 1.4682668 | 1.4699117 | 1.4683258 | |
| | | .00164497 | .00005902 | Difference |
| | | .00112035 | .0000402 | Relative difference |
| ----- | | | | |
| nc_pos: 2.imdnew | .55689522 | .55750266 | .55688111 | |
| | | .00060744 | -.0000141 | Difference |
| | | .00109076 | -.00002532 | Relative difference |
| ----- | | | | |
| nc_pos: 3.imdnew | .2649832 | .26505685 | .26497943 | |
| | | .00007366 | -3.767e-06 | Difference |
| | | .00027797 | -.00001422 | Relative difference |
| ----- | | | | |
| nc_pos: _cons | 1.2341673 | 1.2348307 | 1.2341097 | |
| | | .00066342 | -.00005758 | Difference |
| | | .00053755 | -.00004665 | Relative difference |
| ----- | | | | |
| /: lnsig2u | .74236747 | .74531251 | .74224271 | |
| | | .00294504 | -.00012476 | Difference |
| | | .00396709 | -.00016806 | Relative difference |
| ----- | | | | |

| isolatenew | vocnew | | Total |
|------------|---------|--------|--------|
| | Non-VOC | VOC | |
| no | 60 | 263 | 323 |
| | 58.82 | 74.72 | 71.15 |
| yes | 42 | 89 | 131 |
| | 41.18 | 25.28 | 28.85 |
| Total | 102 | 352 | 454 |
| | 100.00 | 100.00 | 100.00 |

| isolatenew | NC_pos | | Total |
|------------|--------|-------|--------|
| | Neg | Pos | |
| no | 64 | 259 | 323 |
| | 19.81 | 80.19 | 100.00 |
| yes | 38 | 93 | 131 |
| | 29.01 | 70.99 | 100.00 |
| Total | 102 | 352 | 454 |
| | 22.47 | 77.53 | 100.00 |

Random-effects logistic regression Number of obs = 454

```

Group variable: hh_id                               Number of groups =      276
Random effects u_i ~ Gaussian                       Obs per group:
                                                    min =      1
                                                    avg =     1.6
                                                    max =      7
Integration method: mvaghermite                    Integration pts. =     12
Log likelihood = -233.47525                          Wald chi2(1) =      3.85
                                                    Prob > chi2 =     0.0498

```

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|------------|------------|-----------|-------|-------|----------------------|----------|
| ----- | | | | | | |
| isolateneu | | | | | | |
| yes | .4765333 | .1800673 | -1.96 | 0.050 | .227222 | .9993928 |
| _cons | 6.907094 | 2.056209 | 6.49 | 0.000 | 3.853867 | 12.37924 |
| ----- | | | | | | |
| /lnsig2u | .7975741 | .5188084 | | | -.2192716 | 1.81442 |
| ----- | | | | | | |
| sigma_u | 1.490016 | .3865165 | | | .8961604 | 2.477401 |
| rho | .4029295 | .1248135 | | | .1962153 | .6510306 |
| ----- | | | | | | |

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 12.42 Prob >= chibar2 = 0.000

Refitting model intpoints() = 8
Refitting model intpoints() = 16

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|----------------------|-----------------------------|--------------------------------|---------------------------------|---------------------|
| Log likelihood | -233.47525 | -233.4815 | -233.47542 | |
| | | -.00625457 | -.0001701 | Difference |
| | | .00002679 | 7.285e-07 | Relative difference |
| ----- | | | | |
| nc_pos: 1.isolateneu | -.74121762 | -.74247132 | -.74118178 | |
| | | -.0012537 | .00003584 | Difference |
| | | .00169141 | -.00004836 | Relative difference |
| ----- | | | | |
| nc_pos: _cons | 1.932549 | 1.9344223 | 1.932442 | |
| | | .00187325 | -.00010707 | Difference |
| | | .00096932 | -.00005541 | Relative difference |
| ----- | | | | |
| /: ln sig2u | .79757409 | .80133424 | .79738402 | |
| | | .00376015 | -.00019007 | Difference |
| | | .00471448 | -.00023831 | Relative difference |
| ----- | | | | |

| close_cont act | vocnew | | Total |
|----------------|---------|--------|--------|
| | Non-VOC | VOC | |
| 0 | 19 | 49 | 68 |
| | 18.63 | 13.92 | 14.98 |
| ----- | | | |
| 1 | 43 | 114 | 157 |
| | 42.16 | 32.39 | 34.58 |
| ----- | | | |
| 2 | 15 | 58 | 73 |
| | 14.71 | 16.48 | 16.08 |
| ----- | | | |
| 3 | 25 | 131 | 156 |
| | 24.51 | 37.22 | 34.36 |
| ----- | | | |
| Total | 102 | 352 | 454 |
| | 100.00 | 100.00 | 100.00 |

| close_cont act | NC_pos | | Total |
|----------------|--------|-------|--------|
| | Neg | Pos | |
| 0 | 24 | 44 | 68 |
| | 35.29 | 64.71 | 100.00 |

| 1 | 39 | 118 | 157 |
|-------|-------|-------|--------|
| | 24.84 | 75.16 | 100.00 |
| 2 | 14 | 59 | 73 |
| | 19.18 | 80.82 | 100.00 |
| 3 | 25 | 131 | 156 |
| | 16.03 | 83.97 | 100.00 |
| Total | 102 | 352 | 454 |
| | 22.47 | 77.53 | 100.00 |

```

Random-effects logistic regression      Number of obs   =      454
Group variable: hh_id                 Number of groups =      276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =          1
                                         avg =          1.6
                                         max =          7

Integration method: mvaghermite        Integration pts. =      12

Log likelihood = -230.63371            Wald chi2(3)    =        8.58
                                         Prob > chi2     =       0.0354

```

| | nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|---------------|----------|------------|-----------|------|-------|----------------------|----------|
| close_contact | | | | | | | |
| | 1 | 1.931561 | .9047636 | 1.41 | 0.160 | .7712526 | 4.837492 |
| | 2 | 3.411578 | 1.947697 | 2.15 | 0.032 | 1.114288 | 10.44511 |
| | 3 | 3.860246 | 1.932494 | 2.70 | 0.007 | 1.447076 | 10.29766 |
| | _cons | 2.334521 | .9437257 | 2.10 | 0.036 | 1.057064 | 5.15578 |
| | /lnsig2u | .8614943 | .5371987 | | | -.1913958 | 1.914384 |
| | sigma_u | 1.538407 | .413215 | | | .9087385 | 2.604374 |
| | rho | .418398 | .1307225 | | | .200649 | .6733854 |

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 11.73 Prob >= chibar2 = 0.000

Refitting model intpoints() = 8
Refitting model intpoints() = 16

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|----------------|-----------------------------|--------------------------------|---------------------------------|---------------------|
| Log likelihood | -230.63371 | -230.64074 | -230.63395 | |
| | | -.00703513 | -.00023769 | Difference |
| | | .0000305 | 1.031e-06 | Relative difference |
| nc_pos: | .65832848 | .65941462 | .65827697 | |
| 1.close_co~t | | .00108614 | -.00005151 | Difference |
| | | .00164985 | -.00007824 | Relative difference |
| nc_pos: | 1.2271749 | 1.2296356 | 1.2270703 | |
| 2.close_co~t | | .00246073 | -.00010455 | Difference |
| | | .0020052 | -.0000852 | Relative difference |
| nc_pos: | 1.350731 | 1.3529793 | 1.350674 | |
| 3.close_co~t | | .00224837 | -.00005701 | Difference |
| | | .00166456 | -.0000422 | Relative difference |
| nc_pos: | .84780661 | .8483896 | .8477465 | |
| _cons | | .00058299 | -.00006011 | Difference |
| | | .00068765 | -.0000709 | Relative difference |
| /: | .86149431 | .86668334 | .86127062 | |
| lnsig2u | | .00518903 | -.00022369 | Difference |
| | | .00602328 | -.00025966 | Relative difference |

```

-----
RECODE of |
diffpcrser |          vocnew
o |      Non-VOC      VOC |      Total
-----+-----+-----+-----
<100 |          2        102 |         104
      |         1.96      28.98 |         22.91
-----+-----+-----+-----
100-150 |          58        148 |         206
      |         56.86      42.05 |         45.37
-----+-----+-----+-----
>150 |          42        102 |         144
      |         41.18      28.98 |         31.72
-----+-----+-----+-----
Total |          102        352 |         454
      |        100.00     100.00 |        100.00

```

```

RECODE of |
diffpcrser |          NC_pos
o |          Neg          Pos |      Total
-----+-----+-----+-----
<100 |          13          91 |         104
      |         12.50      87.50 |        100.00
-----+-----+-----+-----
100-150 |          47          159 |         206
      |         22.82      77.18 |        100.00
-----+-----+-----+-----
>150 |          42          102 |         144
      |         29.17      70.83 |        100.00
-----+-----+-----+-----
Total |          102          352 |         454
      |         22.47      77.53 |        100.00

```

```

Random-effects logistic regression      Number of obs      =      454
Group variable: hh_id                  Number of groups   =      276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =              1
                                         avg =              1.6
                                         max =              7

Integration method: mvaghermite        Integration pts.   =      12

Log likelihood = -231.48092             Wald chi2(2)      =      7.05
                                         Prob > chi2       =      0.0295

```

```

-----
nc_pos | Odds Ratio  Std. Err.    z    P>|z|    [95% Conf. Interval]
-----+-----+-----+-----+-----+-----
diffpcrsero_cat3 |
100-150 | .3882039   .1874793   -1.96  0.050   .1506539   1.000321
>150 | .2607014   .1320531   -2.65  0.008   .0966016   .7035623
      |
_cons | 13.26599   6.569921    5.22  0.000   5.025576   35.01816
-----+-----+-----+-----+-----+-----
/lnsig2u | .6964202   .5368976
-----+-----+-----+-----+-----+-----
sigma_u | 1.41653    .3802657
rho | .3788512   .1263443
-----+-----+-----+-----+-----+-----

```

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 10.51          Prob >= chibar2 = 0.001

```

```

Refitting model intpoints() = 8
Refitting model intpoints() = 16

```

Quadrature check

```

-----
Fitted      Comparison      Comparison
quadrature  quadrature      quadrature
12 points   8 points        16 points
-----+-----+-----+-----+-----
Log          -231.48092      -231.48372      -231.48096
likelihood   -.00279762      -.00003857      -0.00003857   Difference
                                         .00001209      1.666e-07     Relative difference

```



```

-----
nc_pos:      -.94622459      -.94749653      -.94629708
2.diffpcrs~3      -.00127194      -.00007249      Difference
                  .00134423      .00007661      Relative difference
-----
nc_pos:      -1.3443796      -1.3460817      -1.3444416
3.diffpcrs~3      -.00170211      -.00006202      Difference
                  .0012661      .00004613      Relative difference
-----
nc_pos:      2.5852035      2.5874489      2.5852545
  _cons      .00224546      .000051      Difference
              .00086858      .00001973      Relative difference
-----
/:      .69642019      .6992171      .69641754
lnsig2u      .00279692      -2.647e-06      Difference
              .00401613      -3.802e-06      Relative difference
-----

```

| RECODE of dayshh | vocnew | | Total |
|---------------------|---------|--------|--------|
| | Non-VOC | VOC | |
| 0 | 23 | 33 | 56 |
| | 22.55 | 9.38 | 12.33 |
| 1-3d | 22 | 61 | 83 |
| | 21.57 | 17.33 | 18.28 |
| 4-7d | 26 | 111 | 137 |
| | 25.49 | 31.53 | 30.18 |
| >7d | 31 | 147 | 178 |
| | 30.39 | 41.76 | 39.21 |
| Total | 102 | 352 | 454 |
| | 100.00 | 100.00 | 100.00 |

| RECODE of dayshh | NC_pos | | Total |
|---------------------|--------|-------|--------|
| | Neg | Pos | |
| 0 | 19 | 37 | 56 |
| | 33.93 | 66.07 | 100.00 |
| 1-3d | 24 | 59 | 83 |
| | 28.92 | 71.08 | 100.00 |
| 4-7d | 29 | 108 | 137 |
| | 21.17 | 78.83 | 100.00 |
| >7d | 30 | 148 | 178 |
| | 16.85 | 83.15 | 100.00 |
| Total | 102 | 352 | 454 |
| | 22.47 | 77.53 | 100.00 |

```

Random-effects logistic regression      Number of obs      =      454
Group variable: hh_id                  Number of groups   =      276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =      1
                                         avg  =      1.6
                                         max  =      7

Integration method: mvaghermite        Integration pts.   =      12

Log likelihood = -231.10402             Wald chi2(3)      =      7.55
                                         Prob > chi2       =      0.0563

```

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|------------|------------|-----------|------|-------|----------------------|----------|
| dayshh_cat | | | | | | |
| 1-3d | 1.323575 | .7179555 | 0.52 | 0.605 | .4571155 | 3.832405 |
| 4-7d | 2.507044 | 1.34648 | 1.71 | 0.087 | .8749831 | 7.183302 |
| >7d | 3.773342 | 2.076606 | 2.41 | 0.016 | 1.283155 | 11.09617 |
| _cons | 2.460671 | 1.10357 | 2.01 | 0.045 | 1.021654 | 5.926566 |

```

/lnsig2u | .8381753 .5306845 -.2019473 1.878298
-----+-----
sigma_u | 1.520574 .4034724 .9039568 2.557804
rho | .4127346 .1286298 .198962 .6653995
-----+-----

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 12.27 Prob >= chibar2 = 0.000

Refitting model intpoints() = 8
Refitting model intpoints() = 16

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|-------------------------|-----------------------------------|--------------------------------------|---------------------------------------|---------------------|
| Log likelihood | -231.10402 | -231.11028 | -231.10422 | |
| | | -.00625626 | -.00019967 | Difference |
| | | .00002707 | 8.640e-07 | Relative difference |
| nc_pos: 1.dayshh_cat | .28033671 | .28051364 | .28033181 | |
| | | .00017693 | -4.897e-06 | Difference |
| | | .00063115 | -.00001747 | Relative difference |
| nc_pos: 2.dayshh_cat | .91910423 | .92072542 | .91905128 | |
| | | .00162119 | -.00005296 | Difference |
| | | .00176388 | -.00005762 | Relative difference |
| nc_pos: 3.dayshh_cat | 1.3279611 | 1.3304537 | 1.327941 | |
| | | .00249265 | -.00002002 | Difference |
| | | .00187705 | -.00001508 | Relative difference |
| nc_pos: _cons | .90043412 | .9009076 | .90038752 | |
| | | .00047348 | -.0000466 | Difference |
| | | .00052583 | -.00005175 | Relative difference |
| /: lnsig2u | .83817526 | .84286857 | .83803938 | |
| | | .00469331 | -.00013589 | Difference |
| | | .00559943 | -.00016212 | Relative difference |

3. Summary of VOC and nc_pos - unadjusted

```
. tab vocnew nc_pos, row
```

| vocnew | NC_pos | | Total |
|---------|--------------|--------------|---------------|
| | Neg | Pos | |
| Non-VOC | 39 38.24 | 63 61.76 | 102 100.00 |
| VOC | 63 17.90 | 289 82.10 | 352 100.00 |
| Total | 102 22.47 | 352 77.53 | 454 100.00 |

```
. xtlogit nc_pos i.vocnew, re or nolog/* Random effects logistic. [3.54] NB: rho is large (0.33) so numerical approx should be checked*/
```

```
Random-effects logistic regression      Number of obs   =      454
Group variable: hh_id                  Number of groups =      276
```

```
Random effects u_i ~ Gaussian          Obs per group:
                                         min =      1
                                         avg =     1.6
                                         max =      7
```

```
Integration method: mvaghermite        Integration pts. =      12
```

```
Log likelihood = -229.46051            Wald chi2(1)    =     11.41
                                         Prob > chi2     =     0.0007
```

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------|------------|-----------|------|-------|----------------------|----------|
| vocnew | | | | | | |
| VOC | 3.542754 | 1.32668 | 3.38 | 0.001 | 1.700536 | 7.380679 |
| _cons | 1.943125 | .6121677 | 2.11 | 0.035 | 1.047938 | 3.603012 |
| /lnsig2u | .4897778 | .5991911 | | | -.684615 | 1.664171 |
| sigma_u | 1.277479 | .3827271 | | | .7101298 | 2.298106 |
| rho | .3315751 | .1328005 | | | .1329109 | .61617 |

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 7.55          Prob >= chibar2 = 0.003
```

```
. quadchk, nooutput
```

```
Refitting model intpoints() = 8
Refitting model intpoints() = 16
```

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|---------------------|--------------------------------|---------------------------------------|---------------------------------------|-----------------------------------|
| Log likelihood | -229.46051 | -229.46195 -.00143828 6.268e-06 | -229.46057 -.00006136 2.674e-07 | Difference Relative difference |
| nc_pos: 1.vocnew | 1.2649045 | 1.2655141 .00060965 .00048197 | 1.264907 2.516e-06 1.989e-06 | Difference Relative difference |
| nc_pos: _cons | .66429728 | .66454057 .00024329 .00036624 | .66430144 4.165e-06 6.270e-06 | Difference Relative difference |
| /: lnsig2u | .48977785 | .49191591 .00213807 .00436538 | .48980178 .00002394 .00004887 | Difference Relative difference |

4. Summary of VOC and nc_pos – adjusted (with continuous covariates grouped – diffpcrsero [3 levels]; dayshh [4 levels]; imd [4 levels])

```
. xtlogit nc_pos i.vocnew i.sexnew agenew i.diffpcrsero_cat3 i.dayshh_cat i.imdnew
i.close_contact, re or nolog
```

```
Random-effects logistic regression      Number of obs   =    454
Group variable: hh_id                  Number of groups =    276
```

```
Random effects u_i ~ Gaussian          Obs per group:
                                         min =    1
                                         avg =   1.6
                                         max =    7
```

```
Integration method: mvaghermite       Integration pts. =    12
```

```
Log likelihood = -220.37474            Wald chi2(14)   =    20.73
                                         Prob > chi2     =    0.1088
```

| | nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] |
|------------------|---------|------------|-----------|-------|-------|----------------------|
| vocnew | VOC | 2.394783 | .9624276 | 2.17 | 0.030 | 1.089384 5.26443 |
| sexnew | female | .8586828 | .25708 | -0.51 | 0.611 | .4775211 1.544091 |
| agenew | | 1.004246 | .0075533 | 0.56 | 0.573 | .9895503 1.01916 |
| diffpcrsero_cat3 | 100-150 | .5220589 | .2544353 | -1.33 | 0.182 | .2008493 1.356965 |
| | >150 | .3408856 | .174178 | -2.11 | 0.035 | .1252221 .9279754 |
| dayshh_cat | 1-3d | .9645288 | .5266307 | -0.07 | 0.947 | .3307965 2.812351 |
| | 4-7d | 1.386087 | .7818336 | 0.58 | 0.563 | .4588419 4.187141 |
| | >7d | 1.892842 | 1.070006 | 1.13 | 0.259 | .625084 5.731793 |
| imdnew | 2nd | 2.419628 | 1.946274 | 1.10 | 0.272 | .5001131 11.70655 |
| | 3rd | 1.105704 | .541181 | 0.21 | 0.837 | .4236655 2.885725 |
| | 4th | .9940233 | .5347686 | -0.01 | 0.991 | .346309 2.853181 |
| close_contact | 1 | 1.538946 | .7458413 | 0.89 | 0.374 | .5952419 3.978811 |
| | 2 | 2.105478 | 1.263663 | 1.24 | 0.215 | .6493481 6.826903 |
| | 3 | 2.706174 | 1.459996 | 1.85 | 0.065 | .9399994 7.790832 |
| _cons | | 1.66391 | 1.344699 | 0.63 | 0.529 | .3413708 8.110235 |
| /lnsig2u | | .50901 | .6437654 | | | -.752747 1.770767 |
| sigma_u | | 1.289823 | .4151717 | | | .6863459 2.423914 |
| rho | | .3358513 | .1435952 | | | .1252535 .6410489 |

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 6.10          Prob >= chibar2 = 0.007
```

5. Summary of VOC and nc_pos – adjusted (with continuous covariates + age assessed using fractional polynomials); no adjustment for close_contact

```
. * fractional polynomials for continuous terms for agenevm, diffpcrsero and dayshh
. mfp: xtlogit nc_pos vocnew agenev diffpcrsero dayshh imd_rank, re or nolog
```

Deviance for model with all terms untransformed = 451.141, 454 observations

[vocnew included with 1 df in model]

| Variable | Type | DF | Initial | Final | Alpha | Status | Powers |
|-------------|-------|-----|---------|-------|-------|--------|--------|
| diffpcrsero | lin. | FP2 | 451.141 | 0.281 | 0.964 | 1 | 0 3 |
| | Final | | 451.141 | | | 1 | |
| dayshh | lin. | FP2 | 451.141 | 6.180 | 0.103 | 1 | 1 2 |
| | Final | | 451.141 | | | 1 | |
| agenev | lin. | FP2 | 451.141 | 0.797 | 0.850 | 1 | 3 3 |
| | Final | | 451.141 | | | 1 | |
| imd_rank | lin. | FP2 | 451.141 | 0.759 | 0.859 | 1 | -2 -1 |
| | Final | | 451.141 | | | 1 | |

Fractional polynomial fitting algorithm converged after 1 cycle.

Transformations of covariates:

```
-> gen double Iagen__1 = agenev-41.10352423 if e(sample)
-> gen double Idiff__1 = diffpcrsero-130.7400881 if e(sample)
-> gen double Idays__1 = dayshh-8.372246696 if e(sample)
-> gen double Iimd__1 = imd_rank-11221.59251 if e(sample)
```

Final multivariable fractional polynomial model for nc_pos

| Variable | df | Select | Alpha | Status | df | Powers |
|-------------|----|--------|--------|--------|----|--------|
| vocnew | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| agenev | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| diffpcrsero | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| dayshh | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| imd_rank | 4 | 1.0000 | 0.0500 | in | 1 | 1 |

Random-effects logistic regression
Group variable: hh_id
Number of obs = 454
Number of groups = 276

Random effects u_i ~ Gaussian
Obs per group:
min = 1
avg = 1.6
max = 7

Integration method: mvaghermite
Integration pts. = 12

Log likelihood = -225.57054
Wald chi2(5) = 16.47
Prob > chi2 = 0.0056

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] |
|----------|------------|-----------|-------|-------|----------------------|
| vocnew | 2.706961 | 1.058336 | 2.55 | 0.011 | 1.258025 5.824717 |
| Iagen__1 | 1.009618 | .0069873 | 1.38 | 0.167 | .9960159 1.023406 |
| Idiff__1 | .991264 | .004792 | -1.82 | 0.070 | .9819163 1.000701 |
| Idays__1 | 1.033742 | .0217829 | 1.57 | 0.115 | .9919178 1.07733 |
| Iimd__1 | .9999948 | .0000209 | -0.25 | 0.804 | .9999538 1.000036 |
| _cons | 2.426699 | .821718 | 2.62 | 0.009 | 1.249643 4.712441 |
| /lnsig2u | .4524772 | .6260598 | | | -.7745774 1.679532 |
| sigma_u | 1.253875 | .3925003 | | | .6788951 2.315825 |
| rho | .3233606 | .136981 | | | .1228812 .6197964 |

Note: Estimates are transformed only in the first equation.
 Note: _cons estimates baseline odds (conditional on zero random effects).
 LR test of rho=0: chibar2(01) = 6.77 Prob >= chibar2 = 0.005
 Deviance: 451.141.

:

6. Summary of VOC and nc_pos – adjusted (with continuous covariates + age assessed using fractional polynomials); plus adjustment for close_contact (assumed as factors)

```
. mfp, df(agenew diffpcrsero dayshh imd_rank:4): xtlogit nc_pos vocnew sexnew agenew
diffpcrsero dayshh imd_rank close_contacta close_contactb close_contactc, re or nolog
```

Deviance for model with all terms untransformed = 445.167, 454 observations

[vocnew included with 1 df in model]

[close_contactc included with 1 df in model]

```
diffpcrsero lin. FP2 445.167 0.180 0.981 1 2 3
             Final 445.167 1
```

[close_contactb included with 1 df in model]

[close_contacta included with 1 df in model]

```
dayshh lin. FP2 445.167 3.877 0.275 1 1 2
        Final 445.167 1
```

```
agenew lin. FP2 445.167 0.777 0.855 1 -2 2
        Final 445.167 1
```

[sexnew included with 1 df in model]

```
imd_rank lin. FP2 445.167 0.810 0.847 1 -2 -1
          Final 445.167 1
```

Fractional polynomial fitting algorithm converged after 1 cycle.

Transformations of covariates:

```
-> gen double Iagen__1 = agenew-41.10352423 if e(sample)
-> gen double Idiff__1 = diffpcrsero-130.7400881 if e(sample)
-> gen double Idayshh__1 = dayshh-8.372246696 if e(sample)
-> gen double Iimd__1 = imd_rank-11221.59251 if e(sample)
```

Final multivariable fractional polynomial model for nc_pos

| Variable | -----Initial----- | | | -----Final----- | | |
|--------------|-------------------|--------|--------|-----------------|----|--------|
| | df | Select | Alpha | Status | df | Powers |
| vocnew | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| sexnew | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| agenew | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| diffpcrsero | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| dayshh | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| imd_rank | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| close_con... | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| close_con... | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| close_con... | 1 | 1.0000 | 0.0500 | in | 1 | 1 |

```
Random-effects logistic regression          Number of obs    =    454
Group variable: hh_id                     Number of groups =    276
```

```
Random effects u_i ~ Gaussian              Obs per group:
                                          min =    1
                                          avg =    1.6
                                          max =    7
```

```

Integration method: mvaghermite           Integration pts. =          12
                                           Wald chi2(9)      =          19.34
Log likelihood = -222.58337                Prob > chi2       =          0.0224

```

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------------|------------|-----------|-------|-------|----------------------|----------|
| vocnew | 2.541672 | 1.012601 | 2.34 | 0.019 | 1.164129 | 5.549293 |
| sexnew | .8790088 | .2592811 | -0.44 | 0.662 | .4930767 | 1.567011 |
| Iagen__1 | 1.004305 | .007453 | 0.58 | 0.563 | .9898034 | 1.01902 |
| Idiff__1 | .9902699 | .0049169 | -1.97 | 0.049 | .9806796 | .9999539 |
| Idays__1 | 1.021089 | .0220517 | 0.97 | 0.334 | .9787699 | 1.065237 |
| Iimd__1 | 1.000001 | .0000218 | 0.03 | 0.974 | .9999581 | 1.000043 |
| close_contacta | 1.805578 | .8254464 | 1.29 | 0.196 | .7370162 | 4.423392 |
| close_contactb | 2.513999 | 1.409449 | 1.64 | 0.100 | .8378131 | 7.543675 |
| close_contactc | 3.174559 | 1.607752 | 2.28 | 0.023 | 1.176504 | 8.565912 |
| _cons | 1.320507 | .6578477 | 0.56 | 0.577 | .4973826 | 3.505829 |
| /lnsig2u | .4770832 | .6460376 | | | -.7891273 | 1.743294 |
| sigma_u | 1.269397 | .4100389 | | | .6739741 | 2.390845 |
| rho | .3287676 | .1425672 | | | .1213215 | .6347029 |

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 6.15          Prob >= chibar2 = 0.007
Deviance: 445.167.

```

7. Summary of VOC and nc_pos – adjusted (with continuous covariates + age assessed using fractional polynomials); adjustment for close_contact (assuming quantitative)

```

. mfp, df(agenew diffpcrsero dayshh imd_rank close_contact:4): xtlogit nc_pos vocnew sexnew
agenew diffpcrsero dayshh imd_rank close_contact, re or nolog

```

Deviance for model with all terms untransformed = 445.533, 454 observations

[vocnew included with 1 df in model]

```

close_con... lin.   FP2    445.533    0.366  0.947    1        -2  0
              Final    445.533                1
diffpcrsero lin.   FP2    445.533    0.198  0.978    1        1  3
              Final    445.533                1
dayshh       lin.   FP2    445.533    4.148  0.246    1        1  2
              Final    445.533                1
agenew       lin.   FP2    445.533    0.881  0.830    1        -1  1
              Final    445.533                1

```

[sexnew included with 1 df in model]

```

imd_rank     lin.   FP2    445.533    0.717  0.869    1        -2 -1
              Final    445.533                1

```

Fractional polynomial fitting algorithm converged after 1 cycle.

Transformations of covariates:

```

-> gen double Iagen__1 = agenew-41.10352423 if e(sample)
-> gen double Idiff__1 = diffpcrsero-130.7400881 if e(sample)
-> gen double Idays__1 = dayshh-8.372246696 if e(sample)
-> gen double Iimd__1 = imd_rank-11221.59251 if e(sample)
-> gen double Iclos__1 = close_contact-1.698237885 if e(sample)

```

Final multivariable fractional polynomial model for nc_pos

```

-----
Variable | -----Initial-----          -----Final-----

```

```

-----+-----+-----+-----+-----+-----+-----
                |  df      Select  Alpha    Status    df    Powers
-----+-----+-----+-----+-----+-----+-----
    vocnew |      1      1.0000  0.0500    in      1      1
    sexnew |      1      1.0000  0.0500    in      1      1
    agenew |      4      1.0000  0.0500    in      1      1
diffpcrsero |      4      1.0000  0.0500    in      1      1
    dayshh |      4      1.0000  0.0500    in      1      1
    imd_rank |      4      1.0000  0.0500    in      1      1
close_con... |      4      1.0000  0.0500    in      1      1
-----+-----+-----+-----+-----+-----+-----

Random-effects logistic regression
Group variable: hh_id
                                Number of obs   =    454
                                Number of groups =    276

Random effects u_i ~ Gaussian
                                Obs per group:
                                    min =         1
                                    avg =         1.6
                                    max =         7

Integration method: mvaghermite
                                Integration pts. =     12

Log likelihood = -222.76656
                                Wald chi2(7)     =     19.48
                                Prob > chi2      =     0.0068
-----+-----+-----+-----+-----+-----+-----

```

| nc_pos | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|-------------------------------------|------------|-----------|-------|-------|----------------------|----------|
| vocnew | 2.485695 | .9772936 | 2.32 | 0.021 | 1.150227 | 5.371707 |
| sexnew | .8820909 | .2581135 | -0.43 | 0.668 | .497094 | 1.565266 |
| Iagen__1 | 1.00412 | .0072218 | 0.57 | 0.568 | .9900645 | 1.018374 |
| Idiff__1 | .9901183 | .0048778 | -2.02 | 0.044 | .980604 | .9997249 |
| Idays__1 | 1.022191 | .0219288 | 1.02 | 0.306 | .9801028 | 1.066087 |
| Iimd__1 | .9999992 | .0000212 | -0.04 | 0.971 | .9999577 | 1.000041 |
| Iclos__1 | 1.422322 | .2195464 | 2.28 | 0.022 | 1.051013 | 1.924808 |
| _cons | 2.82485 | 1.088493 | 2.69 | 0.007 | 1.327406 | 6.011556 |
| -----+-----+-----+-----+-----+----- | | | | | | |
| /lnsig2u | .4492293 | .6411026 | | | -.8073086 | 1.705767 |
| -----+-----+-----+-----+-----+----- | | | | | | |
| sigma_u | 1.25184 | .401279 | | | .667875 | 2.346403 |
| rho | .3226504 | .1401111 | | | .1193967 | .6259591 |

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 6.14 Prob >= chibar2 = 0.007
Deviance: 445.533.

8. Summary of VOC and nc_pos

| | % NC_pos (n/N) | Unadjusted OR (95% CI) | P-value | Adjusted OR*(95% CI) | P-value |
|---------|----------------|------------------------|---------|----------------------|---------|
| Non-VOC | 62% (63/102) | | | | |
| VOC | 82% (289/352) | 3.5 (1.7-7.4) | 0.001 | 2.5 (1.2-5.4) | 0.02 |

* adjusted for sex, age (years; linear), time since pcr_date date to date of HH serology (days; linear), infectious index and HHC in contact (days; linear), IMD (rank; linear), close contacts (4 levels assuming a linear trend)

9. Summary of potential confounders with infection

```
. ***** new outcome : infected
.
. foreach var in sexnew imdnew isolatnew close_contact diffpcrzero_cat3 dayshh_cat {
2.
.     tab `var' infected, row nokey
3.     xtlogit infected i.`var', re or nolog
4.     quadchk, nooutput
5. }
```

| sexnew | INFECTED | | Total |
|--------|-------------|--------------|---------------|
| | 0 | 1 | |
| male | 28 14.51 | 165 85.49 | 193 100.00 |
| female | 42 16.09 | 219 83.91 | 261 100.00 |
| Total | 70 15.42 | 384 84.58 | 454 100.00 |

```
Random-effects logistic regression      Number of obs   =      454
Group variable: hh_id                  Number of groups =      276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =          1
                                         avg =         1.6
                                         max =          7

Integration method: mvaghermite        Integration pts. =      12

Log likelihood = -189.12006            Wald chi2(1)    =         0.47
                                         Prob > chi2     =         0.4947
```

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------|------------|-----------|-------|-------|----------------------|----------|
| sexnew | | | | | | |
| female | .77924 | .2846242 | -0.68 | 0.495 | .3808575 | 1.594337 |
| _cons | 14.60683 | 7.184001 | 5.45 | 0.000 | 5.570756 | 38.29993 |
| /lnsig2u | 1.26862 | .5693602 | | | .1526943 | 2.384545 |
| sigma_u | 1.88572 | .5368271 | | | 1.079337 | 3.29456 |
| rho | .5194333 | .142125 | | | .2615065 | .7674018 |

```
Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 11.89      Prob >= chibar2 = 0.000
```

```
Refitting model intpoints() = 8
Refitting model intpoints() = 16
```

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|--------------------|--------------------------------|---------------------------------------|---------------------------------------|-----------------------------------|
| Log likelihood | -189.12006 | -189.1508 -.03074183 .00016255 | -189.12425 -.00419064 .00002216 | Difference Relative difference |
| infected: 1.sexnew | -.24943615 | -.25343139 -.00399523 .01601705 | -.24967418 -.00023803 .00095427 | Difference Relative difference |
| infected: _cons | 2.6814894 | 2.7226579 .04116845 .01535283 | 2.6817572 .00026779 .00009987 | Difference Relative difference |
| /: lnsg2u | 1.2686198 | 1.3201621 .05154226 .04062861 | 1.2688845 .00026465 .00020862 | Difference Relative difference |

```

-----
      imdnew |          INFECTED
            |          0          1 |          Total
-----+-----+-----+-----
      1st   |          17          55 |          72
            |         23.61         76.39 |         100.00
-----+-----+-----+-----
      2nd   |           3          34 |          37
            |          8.11         91.89 |         100.00
-----+-----+-----+-----
      3rd   |          32         206 |         238
            |         13.45         86.55 |         100.00
-----+-----+-----+-----
      4th   |          18          89 |         107
            |         16.82         83.18 |         100.00
-----+-----+-----+-----
      Total |          70         384 |         454
            |         15.42         84.58 |         100.00

```

```

Random-effects logistic regression      Number of obs   =         454
Group variable: hh_id                 Number of groups =         276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =          1
                                         avg =          1.6
                                         max =          7

Integration method: mvaghermite        Integration pts. =         12

Log likelihood = -187.03158            Wald chi2(3)    =          4.20
                                         Prob > chi2     =         0.2406

```

```

-----
      infected | Odds Ratio   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----+-----+-----+-----+-----
      imdnew   |
      2nd     |   5.122131   4.962827     1.69  0.092    .7668712   34.21204
      3rd     |   2.707812   1.565596     1.72  0.085    .8719126   8.409381
      4th     |   1.729985   1.081287     0.88  0.381    .5081808   5.889335
      _cons   |   5.625091   3.024681     3.21  0.001    1.960776   16.13731
      /lnsig2u |   1.187346   .5951741                .0208259   2.353865
-----+-----+-----+-----+-----+-----
      sigma_u  |   1.810626   .5388189                1.010467   3.244407
      rho     |   .4991245   .1487931                .2368511   .7618807
-----+-----+-----+-----+-----+-----

```

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 10.33      Prob >= chibar2 = 0.001

```

```

Refitting model intpoints() = 8
Refitting model intpoints() = 16

```

Quadrature check

```

-----
      Fitted      Comparison      Comparison
      quadrature  quadrature      quadrature
      12 points   8 points        16 points
-----+-----+-----+-----+-----
Log likelihood  -187.03158      -187.04944      -187.034
                                         Difference
                                         Relative difference
-----+-----+-----+-----+-----
infected: 1.imdnew  1.6335705      1.6524734      1.6347075
                                         Difference
                                         Relative difference
                                         .01890289      .00113693
                                         .01157152      .00069598
-----+-----+-----+-----+-----
infected: 2.imdnew  .9961409       1.0105823      .99658433
                                         Difference
                                         Relative difference
                                         .01444139      .00044343
                                         .01449733      .00044515
-----+-----+-----+-----+-----
infected: 3.imdnew  .54811249      .55427786      .54816655
                                         Difference
                                         Relative difference
                                         .00616537      .00005405
                                         .01124837      .00009862
-----+-----+-----+-----+-----

```

```

infected:      1.727237      1.7452364      1.726907
  _cons        .01799937      .0104209      -.00033002      Difference
                .0104209      -.00019107      Relative difference
-----
/:            1.1873457      1.2278071      1.1872109
  lnsig2u      .04046143      -.00013471      -.00011345      Difference
                .03407721      -.00011345      Relative difference
-----

```

| isolatenew | INFECTED | | Total |
|------------|----------|-------|--------|
| | 0 | 1 | |
| no | 40 | 283 | 323 |
| | 12.38 | 87.62 | 100.00 |
| yes | 30 | 101 | 131 |
| | 22.90 | 77.10 | 100.00 |
| Total | 70 | 384 | 454 |
| | 15.42 | 84.58 | 100.00 |

```

Random-effects logistic regression      Number of obs   =      454
Group variable: hh_id                  Number of groups =      276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =          1
                                         avg =         1.6
                                         max =          7

Integration method: mvaghermite        Integration pts. =      12

Log likelihood = -186.66877             Wald chi2(1)    =         4.94
                                         Prob > chi2     =         0.0262

```

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|------------|------------|-----------|-------|-------|----------------------|----------|
| isolatenew | | | | | | |
| yes | .364505 | .1655033 | -2.22 | 0.026 | .149698 | .8875463 |
| _cons | 15.93961 | 7.471103 | 5.91 | 0.000 | 6.360752 | 39.94358 |
| /lnsig2u | 1.142566 | .6111612 | | | -.0552882 | 2.34042 |
| sigma_u | 1.770537 | .5410418 | | | .9727345 | 3.222669 |
| rho | .4879319 | .1527013 | | | .2233698 | .7594328 |

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 9.57      Prob >= chibar2 = 0.001

```

```

Refitting model intpoints() = 8
Refitting model intpoints() = 16

```

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|----------------|--------------------------------|-----------------------------------|------------------------------------|---------------------|
| Log likelihood | -186.66877 | -186.6835 | -186.67081 | |
| | | -.01473135 | -.0020341 | Difference |
| | | .00007892 | .0000109 | Relative difference |
| infected: | -1.0092149 | -1.0216711 | -1.0100267 | |
| 1.isolatenew | | -.01245616 | -.00081181 | Difference |
| | | .01234242 | .0008044 | Relative difference |
| infected: | 2.7688072 | 2.7982461 | 2.770061 | |
| _cons | | .02943888 | .00125377 | Difference |
| | | .01063233 | .00045282 | Relative difference |
| /: | 1.1425657 | 1.1812145 | 1.1441298 | |
| lnsig2u | | .03864879 | .0015641 | Difference |
| | | .03382632 | .00136894 | Relative difference |

| close_cont act | INFECTED | | Total |
|-------------------|----------|-------|--------|
| | 0 | 1 | |
| 0 | 17 | 51 | 68 |
| | 25.00 | 75.00 | 100.00 |
| 1 | 21 | 136 | 157 |
| | 13.38 | 86.62 | 100.00 |
| 2 | 11 | 62 | 73 |
| | 15.07 | 84.93 | 100.00 |
| 3 | 21 | 135 | 156 |
| | 13.46 | 86.54 | 100.00 |
| Total | 70 | 384 | 454 |
| | 15.42 | 84.58 | 100.00 |

Random-effects logistic regression
Group variable: hh_id

Number of obs = 454
Number of groups = 276

Random effects u_i ~ Gaussian

Obs per group:
min = 1
avg = 1.6
max = 7

Integration method: mvaghermite

Integration pts. = 12

Log likelihood = -186.36335

Wald chi2(3) = 5.10
Prob > chi2 = 0.1646

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|---------------|------------|-----------|------|-------|----------------------|----------|
| close_contact | | | | | | |
| 1 | 3.707632 | 2.323878 | 2.09 | 0.037 | 1.085372 | 12.66528 |
| 2 | 3.828124 | 2.805632 | 1.83 | 0.067 | .9102076 | 16.10021 |
| 3 | 3.306103 | 2.006683 | 1.97 | 0.049 | 1.006163 | 10.86336 |
| _cons | 4.806467 | 2.543582 | 2.97 | 0.003 | 1.70361 | 13.56069 |
| /lnsig2u | 1.435319 | .5863963 | | | .2860032 | 2.584635 |
| sigma_u | 2.04963 | .6009478 | | | 1.153732 | 3.641214 |
| rho | .5608152 | .1444303 | | | .288056 | .8011961 |

Note: Estimates are transformed only in the first equation.

Note: _cons estimates baseline odds (conditional on zero random effects).

LR test of rho=0: chibar2(01) = 12.45 Prob >= chibar2 = 0.000

Refitting model intpoints() = 8

Refitting model intpoints() = 16

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|---------------------------|-----------------------------------|--------------------------------------|---------------------------------------|---------------------|
| Log likelihood | -186.36335 | -186.40454 | -186.37126 | |
| | | -.04118703 | -.00791285 | Difference |
| | | .000221 | .00004246 | Relative difference |
| infected: 1.close_co~t | 1.3103933 | 1.354341 | 1.3121941 | |
| | | .04394772 | .00180077 | Difference |
| | | .03353781 | .00137422 | Relative difference |
| infected: 2.close_co~t | 1.3423749 | 1.3980193 | 1.34371 | |
| | | .05564439 | .00133513 | Difference |
| | | .0414522 | .00099461 | Relative difference |
| infected: 3.close_co~t | 1.1957702 | 1.2295811 | 1.196857 | |
| | | .03381092 | .00108675 | Difference |
| | | .02827543 | .00090883 | Relative difference |
| infected: _cons | 1.5699622 | 1.6065224 | 1.5696796 | |
| | | .03656019 | -.00028266 | Difference |

```

                                .02328731    -.00018004    Relative difference
-----
/:      1.4353188    1.5227711    1.4366071
lnsig2u    .08745226    .00128826    Difference
                                .0609288    .00089754    Relative difference
-----

```

```

RECODE of |
diffpcrser |      INFECTED
  o |      0      1 |      Total
-----+-----+-----
<100 |      9      95 |     104
      |     8.65    91.35 |    100.00
-----+-----+-----
100-150 |     36     170 |     206
      |    17.48    82.52 |    100.00
-----+-----+-----
>150 |     25     119 |     144
      |    17.36    82.64 |    100.00
-----+-----+-----
Total |     70     384 |     454
      |    15.42    84.58 |    100.00
-----

```

```

Random-effects logistic regression      Number of obs    =      454
Group variable: hh_id                  Number of groups =      276

Random effects u_i ~ Gaussian          Obs per group:
                                         min =           1
                                         avg =          1.6
                                         max =           7

Integration method: mvaghermite        Integration pts. =      12

Log likelihood = -186.63517            Wald chi2(2)     =       4.29
                                         Prob > chi2      =     0.1173

```

```

-----
infected | Odds Ratio   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----+-----+-----+-----
diffpcrsero_cat3 |
  100-150 |    .276207   .1805619   -1.97  0.049    .0766986    .9946762
  >150   |    .2710302  .1847091   -1.92  0.055    .0712718    1.030666
  _cons  |    36.349    28.04112    4.66  0.000    8.013837    164.8711
-----+-----+-----+-----+-----
/lnsig2u |    1.264507  .5691402                .149013    2.380002
-----+-----+-----+-----+-----
sigma_u |    1.881847  .5355173                1.077352    3.287084
rho     |    .5184066  .1420922                .2607962    .7665897
-----

```

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 11.81      Prob >= chibar2 = 0.000

```

```

Refitting model intpoints() = 8
Refitting model intpoints() = 16

```

Quadrature check

```

-----
Fitted      Comparison      Comparison
quadrature  quadrature  quadrature
12 points   8 points    16 points
-----+-----+-----+-----
Log          -186.63517  -186.65771  -186.63755
likelihood   -0.0225399  -0.00238026 -0.00238026    Difference
                                .00012077    .00001275    Relative difference
-----+-----+-----+-----
infected:   -1.2866048  -1.3056558  -1.2885305
2.diffpcrs~3  -.01905103  -.00192576  -.00192576    Difference
                                .01480721    .00149678    Relative difference
-----+-----+-----+-----
infected:   -1.3055249  -1.3257099  -1.30756
3.diffpcrs~3  -.02018494  -.00203506  -.00203506    Difference
                                .01546117    .0015588     Relative difference
-----+-----+-----+-----
infected:   3.5931667   3.6406295   3.5956352
_cons       .04746282    .00246852    Difference
-----

```

```

-----
.01320919 .000687 Relative difference
/: 1.2645073 1.3067693 1.2657784
lnsig2u .04226203 .00127112 Difference
.03342174 .00100523 Relative difference
-----

```

| RECODE of dayshh | INFECTED | | Total |
|---------------------|-------------|--------------|---------------|
| | 0 | 1 | |
| 0 | 14 25.00 | 42 75.00 | 56 100.00 |
| 1-3d | 17 20.48 | 66 79.52 | 83 100.00 |
| 4-7d | 22 16.06 | 115 83.94 | 137 100.00 |
| >7d | 17 9.55 | 161 90.45 | 178 100.00 |
| Total | 70 15.42 | 384 84.58 | 454 100.00 |

```

Random-effects logistic regression      Number of obs = 454
Group variable: hh_id                 Number of groups = 276

Random effects u_i ~ Gaussian          Obs per group:
                                        min = 1
                                        avg = 1.6
                                        max = 7

Integration method: mvaghermite        Integration pts. = 12

Log likelihood = -184.41434             Wald chi2(3) = 7.45
                                        Prob > chi2 = 0.0588

```

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|------------|------------|-----------|------|-------|----------------------|----------|
| dayshh_cat | | | | | | |
| 1-3d | 1.308621 | .8418139 | 0.42 | 0.676 | .3708942 | 4.617188 |
| 4-7d | 2.475324 | 1.589671 | 1.41 | 0.158 | .7030465 | 8.715252 |
| >7d | 5.627842 | 3.942839 | 2.47 | 0.014 | 1.425589 | 22.21721 |
| _cons | 4.992694 | 2.834152 | 2.83 | 0.005 | 1.641126 | 15.18896 |
| /lnsig2u | 1.283373 | .5968239 | | | .1136198 | 2.453126 |
| sigma_u | 1.899682 | .5668878 | | | 1.058455 | 3.409492 |
| rho | .5231149 | .1488871 | | | .254031 | .7794182 |

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 11.22      Prob >= chibar2 = 0.000

```

```

Refitting model intpoints() = 8
Refitting model intpoints() = 16

```

Quadrature check

| | Fitted quadrature 12 points | Comparison quadrature 8 points | Comparison quadrature 16 points | |
|---------------------------|-----------------------------------|--------------------------------------|---------------------------------------|---------------------|
| Log likelihood | -184.41434 | -184.43371 | -184.41696 | |
| | | -.01936883 | -.0026269 | Difference |
| | | .00010503 | .00001424 | Relative difference |
| infected: 1.dayshh_cat | .26897372 | .26949963 | .26894139 | |
| | | .00052591 | -.00003233 | Difference |
| | | .00195523 | -.00012021 | Relative difference |
| infected: 2.dayshh_cat | .90637119 | .92567195 | .90733675 | |
| | | .01930076 | .00096556 | Difference |
| | | .02129454 | .0010653 | Relative difference |

```

-----
infected:      1.7277261      1.7565796      1.730153
3.dayshh_cat  .02885345      .00242684      .00242684      Difference
                .01670024      .00140465      .00140465      Relative difference
-----
infected:      1.6079757      1.6282628      1.608615
  _cons        .02028706      .00063934      .00063934      Difference
                .01261652      .00039761      .00039761      Relative difference
-----
/:             1.2833731      1.3332178      1.285901
lnsig2u       .04984464      .00252788      .00252788      Difference
                .03883877      .00196971      .00196971      Relative difference
-----

```

.

10. Summary of VOC and infection - unadjusted

```
. tab vocnew infected, row
```

| vocnew | INFECTED | | Total |
|---------|----------|-------|--------|
| | 0 | 1 | |
| Non-VOC | 25 | 77 | 102 |
| | 24.51 | 75.49 | 100.00 |
| VOC | 45 | 307 | 352 |
| | 12.78 | 87.22 | 100.00 |
| Total | 70 | 384 | 454 |
| | 15.42 | 84.58 | 100.00 |

```
. xtlogit infected i.vocnew, re or nolog/* Random effects logistic. [3.54] NB: rho is large
(0.33) so numerical approx should be checked*/
```

```

Random-effects logistic regression          Number of obs   =       454
Group variable: hh_id                     Number of groups =       276

Random effects u_i ~ Gaussian              Obs per group:
                                           min =           1
                                           avg =           1.6
                                           max =           7

Integration method: mvaghermite            Integration pts. =       12

Log likelihood = -186.37494                Wald chi2(1)    =         5.33
                                           Prob > chi2     =         0.0210

```

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] |
|----------|------------|-----------|------|-------|----------------------|
| vocnew | | | | | |
| VOC | 3.134187 | 1.551193 | 2.31 | 0.021 | 1.188071 8.268132 |
| _cons | 5.060994 | 2.296476 | 3.57 | 0.000 | 2.079672 12.3162 |
| /lnsig2u | 1.17917 | .5982633 | | | .0065957 2.351745 |
| sigma_u | 1.80324 | .5394062 | | | 1.003303 3.240969 |
| rho | .4970807 | .1495607 | | | .2342886 .7614957 |

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 9.97          Prob >= chibar2 = 0.001

```

```
. quadchk, nooutput
```

```

Refitting model intpoints() = 8
Refitting model intpoints() = 16

```

Quadrature check

| Fitted quadrature | Comparison quadrature | Comparison quadrature |
|-------------------|-----------------------|-----------------------|
| 12 points | 8 points | 16 points |

```

-----
Log          -186.37494      -186.39031      -186.37744
likelihood   -.01537189        -.00249734
              .00008248          .0000134
Difference
Relative difference
-----
infected:    1.1423699        1.1598928        1.1428786
1.vocnew     .01752297         .00050875
              .01533914          .00044535
Difference
Relative difference
-----
infected:    1.621563         1.6375047        1.6213921
_cons       .01594172         -.00017092
              .00983108          -.0001054
Difference
Relative difference
-----
/:          1.1791702         1.2212503        1.1792722
lnsig2u     .04208005         .00010197
              .03568615          .00008648
Difference
Relative difference
-----

```

11. Summary of VOC and infection – adjusted (with continuous covariates + age assessed using fractional polynomials); plsu adjustment for close contact (as a factor)

```

. * fractional polynomials for continuous terms for agenevm, diffpcrsero and dayshh
. mfp: xtlogit infected vocnew sexnew agenevm diffpcrsero dayshh imd_rank close_contacta
close_contactb close_contactc, re or nolog

```

Deviance for model with all terms untransformed = 358.230, 454 observations

| Variable | Model (vs.) | Deviance | Dev diff. | P | Powers | (vs.) |
|--|-------------|----------|-----------|-------|--------|-------|
| agenevm | lin. FP2 | 358.230 | 4.078 | 0.253 | 1 | .5 1 |
| | Final | 358.230 | | | 1 | |
| [close_contactc included with 1 df in model] | | | | | | |
| [close_contactb included with 1 df in model] | | | | | | |
| [close_contacta included with 1 df in model] | | | | | | |
| [vocnew included with 1 df in model] | | | | | | |
| diffpcrsero | lin. FP2 | 358.230 | 2.482 | 0.479 | 1 | -2 -2 |
| | Final | 358.230 | | | 1 | |
| [sexnew included with 1 df in model] | | | | | | |
| imd_rank | lin. FP2 | 358.230 | 0.368 | 0.947 | 1 | 1 1 |
| | Final | 358.230 | | | 1 | |
| dayshh | lin. FP2 | 358.230 | 5.165 | 0.160 | 1 | 1 2 |
| | Final | 358.230 | | | 1 | |

Fractional polynomial fitting algorithm converged after 1 cycle.

Transformations of covariates:

```

-> gen double Iagen__1 = agenevm-41.10352423 if e(sample)
-> gen double Idiff__1 = diffpcrsero-130.7400881 if e(sample)
-> gen double Idays__1 = dayshh-8.372246696 if e(sample)
-> gen double Iimd__1 = imd_rank-11221.59251 if e(sample)

```

Final multivariable fractional polynomial model for infected

```

-----
Variable | -----Initial-----      -----Final-----
          | df      Select  Alpha  Status  df      Powers
-----+-----+-----+-----+-----+-----+-----
vocnew   | 1      1.0000  0.0500  in      1      1
sexnew   | 1      1.0000  0.0500  in      1      1
agenevm  | 4      1.0000  0.0500  in      1      1
diffpcrsero | 4      1.0000  0.0500  in      1      1
dayshh   | 4      1.0000  0.0500  in      1      1
-----

```



```

    imd_rank |      4      1.0000  0.0500   in   1   1
close_con... |      1      1.0000  0.0500   in   1   1
close_con... |      1      1.0000  0.0500   in   1   1
close_con... |      1      1.0000  0.0500   in   1   1
-----

```

```

Random-effects logistic regression          Number of obs   =      454
Group variable: hh_id                     Number of groups =      276

Random effects u_i ~ Gaussian              Obs per group:
                                           min =          1
                                           avg =         1.6
                                           max =          7

Integration method: mvaghermite            Integration pts. =       12

Log likelihood = -179.11476                Wald chi2(9)     =       12.79
                                           Prob > chi2      =       0.1723

```

| | infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------------|----------|------------|-----------|-------|-------|----------------------|----------|
| vocnew | | 2.342272 | 1.286055 | 1.55 | 0.121 | .7984979 | 6.870696 |
| sexnew | | .7827221 | .3016591 | -0.64 | 0.525 | .3677533 | 1.665937 |
| Iagen__1 | | .9782973 | .0096063 | -2.23 | 0.025 | .9596493 | .9973076 |
| Idiff__1 | | .9916954 | .006634 | -1.25 | 0.213 | .9787779 | 1.004783 |
| Idays__1 | | 1.0134 | .0286187 | 0.47 | 0.637 | .9588321 | 1.071073 |
| Iimd__1 | | .9999853 | .0000284 | -0.52 | 0.605 | .9999297 | 1.000041 |
| close_contacta | | 3.208471 | 2.036449 | 1.84 | 0.066 | .9247665 | 11.13177 |
| close_contactb | | 4.814071 | 3.761967 | 2.01 | 0.044 | 1.040732 | 22.26824 |
| close_contactc | | 3.959331 | 2.639507 | 2.06 | 0.039 | 1.071924 | 14.62445 |
| _cons | | 2.809021 | 1.84322 | 1.57 | 0.115 | .7762733 | 10.16472 |
| ----- | | | | | | | |
| /lnsig2u | | 1.280453 | .6386182 | | | .0287844 | 2.532122 |
| ----- | | | | | | | |
| sigma_u | | 1.896911 | .6057008 | | | 1.014496 | 3.546853 |
| rho | | .5223864 | .1593345 | | | .2382926 | .7926994 |

```

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 9.45          Prob >= chibar2 = 0.001
Deviance: 358.230.

```

12. Summary of VOC and infection – adjusted (with continuous covariates + age assessed using fractional polynomials); plus adjustment for close contact (as a quantitative variable)

```

. mfp: xtlogit infected vocnew sexnew agenew diffpcrsero dayshh imd_rank close_contact, re or nolog

```

```

Deviance for model with all terms untransformed = 361.053, 454 observations

```

| Variable | Model (vs.) | Deviance | Dev diff. | P | Powers | (vs.) | |
|--------------------------------------|-------------|----------|-----------|-------|--------|-------|-------|
| agenew | lin. | FP2 | 361.053 | 4.820 | 0.185 | 1 | .5 1 |
| | Final | | 361.053 | | | 1 | |
| close_con... | lin. | FP1 | 361.053 | 2.619 | 0.106 | 1 | -2 |
| | Final | | 361.053 | | | 1 | |
| [vocnew included with 1 df in model] | | | | | | | |
| diffpcrsero | lin. | FP2 | 361.053 | 2.812 | 0.422 | 1 | -2 -2 |
| | Final | | 361.053 | | | 1 | |
| imd_rank | lin. | FP2 | 361.053 | 0.401 | 0.940 | 1 | 1 1 |
| | Final | | 361.053 | | | 1 | |
| dayshh | lin. | FP2 | 361.053 | 6.643 | 0.084 | 1 | 1 2 |
| | Final | | 361.053 | | | 1 | |

[sexnew included with 1 df in model]

Fractional polynomial fitting algorithm converged after 1 cycle.

Transformations of covariates:

```
-> gen double Iagen__1 = agenew-41.10352423 if e(sample)
-> gen double Idiff__1 = diffpcrsero-130.7400881 if e(sample)
-> gen double Idays__1 = dayshh-8.372246696 if e(sample)
-> gen double Iimd__1 = imd_rank-11221.59251 if e(sample)
-> gen double Iclos__1 = close_contact-1.698237885 if e(sample)
```

Final multivariable fractional polynomial model for infected

| Variable | -----Initial----- | | | -----Final----- | | |
|--------------|-------------------|--------|--------|-----------------|----|--------|
| | df | Select | Alpha | Status | df | Powers |
| vocnew | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| sexnew | 1 | 1.0000 | 0.0500 | in | 1 | 1 |
| agenew | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| diffpcrsero | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| dayshh | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| imd_rank | 4 | 1.0000 | 0.0500 | in | 1 | 1 |
| close_con... | 2 | 1.0000 | 0.0500 | in | 1 | 1 |

```
Random-effects logistic regression          Number of obs   =      454
Group variable: hh_id                     Number of groups =      276

Random effects u_i ~ Gaussian              Obs per group:
                                           min =          1
                                           avg =         1.6
                                           max =          7

Integration method: mvaghermite            Integration pts. =      12

Log likelihood = -180.52669                 Wald chi2(7)    =      12.81
                                           Prob > chi2     =      0.0769
```

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------|------------|-----------|-------|-------|----------------------|----------|
| vocnew | 2.114488 | 1.069077 | 1.48 | 0.139 | .7849484 | 5.695993 |
| sexnew | .7891921 | .2892698 | -0.65 | 0.518 | .3847548 | 1.618756 |
| Iagen__1 | .9794929 | .0088218 | -2.30 | 0.021 | .9623542 | .9969369 |
| Idiff__1 | .991273 | .0062188 | -1.40 | 0.162 | .979159 | 1.003537 |
| Idays__1 | 1.017929 | .0272873 | 0.66 | 0.507 | .9658271 | 1.07284 |
| Iimd__1 | .9999826 | .000026 | -0.67 | 0.504 | .9999317 | 1.000034 |
| Iclos__1 | 1.412299 | .2738079 | 1.78 | 0.075 | .9658307 | 2.065154 |
| _cons | 8.211732 | 4.589491 | 3.77 | 0.000 | 2.746016 | 24.55651 |
| /lnsig2u | 1.069111 | .6310277 | | | -.1676807 | 2.305903 |
| sigma_u | 1.706689 | .5384842 | | | .9195781 | 3.167527 |
| rho | .4696034 | .1571739 | | | .2044796 | .7530703 |

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 8.20 Prob >= chibar2 = 0.002
Deviance: 361.053.

13. Summary of VOC and infection – adjusted (with continuous covariates + age assessed using fractional polynomials); no adjustment for close contact

```
. mfp: xtlogit infected vocnew sexnew agenew diffpcrsero dayshh imd_rank , re or nolog
```

Deviance for model with all terms untransformed = 364.540, 454 observations

| Variable | Model (vs.) | Deviance | Dev diff. | P | Powers | (vs.) |
|----------|-------------|----------|-----------|---|--------|-------|
|----------|-------------|----------|-----------|---|--------|-------|

```
-----
agenew      lin.   FP2    364.540    3.859  0.277    1          .5 .5
           Final    364.540
           1
```

[vocnew included with 1 df in model]

```
diffpcrsero lin.   FP2    364.540    3.082  0.379    1          -2 -2
           Final    364.540
           1
```

```
dayshh      lin.   FP2    364.540    8.447  0.038+   1          1 2
           FP1    360.471    4.378  0.112   -.5
           Final    360.471   -.5
```

```
imd_rank    lin.   FP2    360.471    0.191  0.979    1          1 2
           Final    360.471
           1
```

[sexnew included with 1 df in model]

```
-----
End of Cycle 1: deviance =    360.471
-----
```

```
agenew      lin.   FP2    360.471    4.392  0.222    1          .5 1
           Final    360.471
           1
```

[vocnew included with 1 df in model]

```
diffpcrsero lin.   FP2    360.471    2.890  0.409    1          -2 -2
           Final    360.471
           1
```

```
dayshh      lin.   FP2    364.540    8.447  0.038+   1          1 2
           FP1    360.471    4.378  0.112   -.5
           Final    360.471   -.5
```

```
imd_rank    lin.   FP2    360.471    0.191  0.979    1          1 2
           Final    360.471
           1
```

[sexnew included with 1 df in model]

Fractional polynomial fitting algorithm converged after 2 cycles.

Transformations of covariates:

```
-> gen double Iagen__1 = agenew-41.10352423 if e(sample)
-> gen double Idiff__1 = diffpcrsero-130.7400881 if e(sample)
-> gen double Idays__1 = X^-.5-1.032947251 if e(sample)
    (where: X = (dayshh+1)/10)
-> gen double Iimd__1 = imd_rank-11221.59251 if e(sample)
```

Final multivariable fractional polynomial model for infected

```
-----
Variable |      -----Initial-----      -----Final-----
          |      df      Select      Alpha      Status      df      Powers
-----|-----|-----|-----|-----|-----|-----
vocnew |      1      1.0000      0.0500      in          1          1
sexnew |      1      1.0000      0.0500      in          1          1
agenew |      4      1.0000      0.0500      in          1          1
diffpcrsero |      4      1.0000      0.0500      in          1          1
dayshh |      4      1.0000      0.0500      in          2          -.5
imd_rank |      4      1.0000      0.0500      in          1          1
-----|-----|-----|-----|-----|-----|-----
```

```
Random-effects logistic regression          Number of obs    =    454
Group variable: hh_id                      Number of groups  =    276
```

```
Random effects u_i ~ Gaussian              Obs per group:
                                           min =    1
                                           avg =    1.6
                                           max =    7
```

```
Integration method: mvaghermite           Integration pts. =    12
```

```
Log likelihood = -180.23557                Wald chi2(6)     =    13.17
                                           Prob > chi2      =    0.0404
```

| infected | Odds Ratio | Std. Err. | z | P> z | [95% Conf. Interval] | |
|----------|------------|-----------|-------|-------|----------------------|----------|
| vocnew | 1.982537 | 1.002312 | 1.35 | 0.176 | .7360017 | 5.340275 |
| sexnew | .855008 | .3079181 | -0.43 | 0.664 | .4221073 | 1.731879 |
| Iagen__1 | .983049 | .0082945 | -2.03 | 0.043 | .9669258 | .9994411 |
| Idiff__1 | .9921711 | .0060788 | -1.28 | 0.200 | .9803281 | 1.004157 |
| Idays__1 | .5641195 | .1477865 | -2.19 | 0.029 | .3375792 | .9426849 |
| Iimd__1 | .9999812 | .0000257 | -0.73 | 0.466 | .9999309 | 1.000032 |
| _cons | 10.15828 | 6.011574 | 3.92 | 0.000 | 3.184837 | 32.40061 |
| /lnsig2u | 1.042304 | .640488 | | | -.2130291 | 2.297638 |
| sigma_u | 1.683967 | .5392803 | | | .898962 | 3.154465 |
| rho | .4629324 | .159242 | | | .1972017 | .7515303 |

Note: Estimates are transformed only in the first equation.
Note: _cons estimates baseline odds (conditional on zero random effects).
LR test of rho=0: chibar2(01) = 7.86 Prob >= chibar2 = 0.003
Deviance: 360.471.

14. Summary of VOC and infection

| | % infection (n/N) | Unadjusted OR (95% CI) | P-value | Adjusted OR* (95% CI) | P-value |
|---------|-------------------|------------------------|---------|-----------------------|---------|
| Non-VOC | 75% (77/102) | | | | |
| VOC | 87% (307/352) | 3.1 (1.2-8.3) | 0.02 | 2.1 (0.8-5.5) | 0.14 |

* adjusted for sex, age (years; linear), time since pcr_date date to date of HH serology (days; linear), infectious index and HHC in contact (days; linear), IMD (rank; linear), close contacts (4 levels assuming a linear trend)

Table 3. Co-variate impact on seropositivity of household contacts in a multivariate logistic regression model, results displayed for both unadjusted model and adjusted for household clustering

| | | Model 1 NC positive as outcome n=352 | | | | Model 2 All NC positive & Unvaccinated Spike positive as outcome n=384 | | |
|-------|---|--|------------------|---------|--------------|--|---------|--|
| | | Adjusted Odds Ratio | | | | Adjusted Odds Ratio | | |
| | | NC positive | aOR(95%CI) | p-value | All infected | aOR(95%CI) | p-value | |
| Index | NonVOC SARS-CoV-2 | 63/102 | *baseline | | 77/102 | | | |
| | VOC SARS-CoV-2 | 289/352 | 2.26 (1.03-4.90) | 0.04 | 307/352 | | | |
| | Days at home whilst symptomatic Median (IQR) | 7(3-12) | 1.02 (0.98-1.07) | 0.3 | 7(3-12) | | | |
| | IMD quartile Lowest (1-2.5) | 81/107 | *baseline | | 89/107 | | | |

| | | | | | | | | |
|-------------------------------|---------------------------------------|-----------------------------|---------------|------------------|------|---------------|--|--|
| | | Second (>2.5-5) | 187/238 | 1.44 (0.70-2.96) | 0.3 | 206/238 | | |
| | | Third (>5-7.5) | 33/37 | 1.58 (0.49-5.07) | 0.4 | 34/37 | | |
| | | Highest (>7.5-10) | 51/72 | 1.27 (0.48-3.34) | 0.6 | 55/72 | | |
| | Time since index PCR diagnosis | | 130 (101-159) | 0.99 (0.98-0.99) | 0.04 | 130 (101-159) | | |
| Contact | sex | female | 202/261 | baseline | | 219/261 | | |
| | | male | 150/193 | 1.13 (0.64-1.98) | 0.7 | 165/193 | | |
| Intensity of Contact** | No close contact within home | | 44/68 | *baseline | | 51/68 | | |
| | Shared bathroom | | 118/157 | 1.94 (0.80-4.69) | 0.14 | 136/157 | | |
| | Shared bedroom | | 61/75 | 2.98 (1.04-8.58) | 0.04 | 64/75 | | |
| | Help with personal care | | 129/154 | 3.38 (1.31-8.75) | 0.01 | 133/154 | | |

Table. 1
Baseline characteristics stratified by Indices VOC and non-VOC SARS-CoV-2 variant status for whom we have serum Total N = 454

| | Non-VOC index case household | Alpha index case household | p-value* |
|------------------------------|------------------------------|----------------------------|----------|
| Number of index - n | 50 | 188 | |
| Number of contacts - n | 102 | 352 | |
| Index characteristics | | | |
| index case female - n (%) | 26 (52) | 111 (59) | 0.3 |

| | | | | |
|--|--------------------|---------------|--------------|--------|
| Index case age – median (IQR) | | 56 (45-72) | 57 (47-69) | 0.9 |
| ethnicity | white (%) | 27 (54) | 96 (51) | 0.3 |
| | Asian (%) | 2 (4) | 14 (8) | |
| | Black (%) | 7 (14) | 34 (18) | |
| | Middle Eastern (%) | 5 (10) | 15 (6) | |
| | SE Asian (%) | 7 (14) | 13 (7) | |
| | other | 2 (4) | 8 (4.3) | |
| Hospital site | Hospital 1 | 49 (48) | 173 (49) | 0.8 |
| | Hospital 2 | 53 (52) | 179 (51) | |
| household size ¹ – median (IQR) | | 3 (2-4) | 3 (2-4) | >0.99 |
| index case respiratory symptoms – n (%) | | 35 (70) | 146 (78) | 0.2 |
| symptom duration in days – median(IQR) | | 7 (3-10) | 7 (5-114) | 0.2 |
| index case hospitalisation – n (%) | | 29 (58) | 124 (66) | 0.3 |
| index case ICU admission – n (%) | | 5 (17) | 35 (29) | 0.3 |
| index case mortality – n(%) | | 1 (2) | 2 (1) | 0.6 |
| IMD decile (IQR) | | 3 (2-6) | 3 (2-5) | 0.7 |
| Time since index PCR diagnosis -median (IQR) | | 146 (125-181) | 119 (93-157) | <0.001 |

| | | | | |
|--|---------------------------|------------|------------|--------|
| Contact characteristics | | | | |
| contact female – n (%) | | 57 (56) | 204 (58) | 0.7 |
| contact age – median (IQR) | | 44 (22-59) | 42 (24-60) | 0.9 |
| days of exposure to index – median (IQR) | | 4 (1-10) | 7 (3-14) | <0.001 |
| proximity to index – n (%) | no close contact | 19(19) | 49(14) | 0.06 |
| | assisted in personal care | 24 (24) | 130 (37) | |
| | shared bedroom | 16 (16) | 59 (17) | |
| | shared bathroom | 43 (42) | 114 (32) | |
| other covid exposure (not index) – n (%) | | 26 (26) | 107 (30) | 0.3 |
| previous COVID-19 diagnosis – n (%) | | 48 (47) | 235 (67) | <0.001 |
| Contact symptoms - n (%) | | 40 (39) | 183 (52) | 0.045 |
| Long COVID - n (%) | | 4 (8) | 8 (4) | 0.1 |
| vaccination status at time of serum sampling | unvaccinated | 49 (48) | 169 (48) | 0.4 |
| | single vaccination | 24 (24) | 102 (29) | |
| | double vaccination | 29 (28) | 81 (23) | |

Supplementary 1. Baseline Characteristics in participants with and without serum samples

| | | Participants without serum samples | Participants with serum samples | p-value* |
|--|--------------------|------------------------------------|---------------------------------|----------|
| Number of index - n | | 200 | 281 | |
| Number of contacts - n | | 385 | 454 | |
| Alpha index | | 162 | 188 | |
| non-VOC index | | 38 | 50 | |
| Index characteristics | | | | |
| index case female - n (%) | | 220 (57.1%) | 255 (56.2%) | 0.3 |
| Index case age – median (IQR) | | 51 (40- 64) | 57 (47-70) | 0.9 |
| ethnicity | white (%) | 27 (54) | 96 (51) | 0.3 |
| | Asian (%) | 2 (4) | 14 (8) | |
| | Black (%) | 7 (14) | 34 (18) | |
| | Middle Eastern (%) | 5 (10) | 15 (6) | |
| | SE Asian (%) | 7 (14) | 13 (7) | |
| | other | 2 (4) | 8 (4.3) | |
| Hospital site | Hospital 1 | 49 (48) | 173 (49) | 0.8 |
| | Hospital 2 | 53 (52) | 179 (51) | |
| household size ¹ – median (IQR) | | 3 (2-4) | 3 (2-4) | >0.99 |

| | | | | |
|---|---------------------------|--------------|---------------|--------|
| index case respiratory symptoms – n (%) | | 35 (70) | 146 (78) | 0.2 |
| symptom duration in days – median(IQR) | | 7 (3-10) | 7 (4-12) | 0.4 |
| index case hospitalisation – n (%) | | 29 (58) | 124 (66) | 0.3 |
| index case ICU admission – n (%) | | 5 (17) | 35 (29) | 0.3 |
| index case mortality – n(%) | | 1 (2) | 2 (1) | 0.6 |
| IMD decile (IQR) | | 3 (2-6) | 3 (2-5) | 0.7 |
| Time since index PCR diagnosis - median (IQR) | | 139(111-164) | 130 (101-158) | 0.003 |
| Contact characteristics | | | | |
| contact female – n (%) | | 172 (45%) | 204 (58) | 0.7 |
| contact age – median (IQR) | | 25 (12-45) | 42 (24-60) | <0.001 |
| days of exposure to index – median (IQR) | | 5 (2-10) | 7 (3-14) | 0.004 |
| proximity to index – n (%) | no close contact | 86(22) | 49(14) | <0.001 |
| | assisted in personal care | 167 (43) | 130 (37) | |
| | shared bedroom | 37 (10) | 59 (17) | |
| | shared bathroom | 97 (25) | 114 (32) | |
| other covid exposure (not index) – n (%) | | 26 (26) | 107 (30) | 0.3 |

| | | | | |
|--|-----------------------|---------|----------|--------|
| previous COVID-19 diagnosis – n (%) | | 48 (47) | 235 (67) | <0.001 |
| Contact symptoms - n (%) | | 40 (39) | 183 (52) | 0.045 |
| Long COVID - n (%) | | 4 (8) | 8 (4) | 0.1 |
| vaccination status at time of serum sampling | unvaccinated | 260(68) | 169 (48) | <0.001 |
| | single vaccination | 68(18) | 102 (29) | |
| | double vaccination | 57(15) | 81 (23) | |

Supplementary Figure 1

Correlation of antibody titres between

- (i) Log normalised alpha VOC vrs non-VOC SARS-CoV-2 spike protein
- (ii) Log normalised alpha VOC vrs non-VOC SARS-CoV-2 RBD

