Carriage dynamics of pneumococcal serotypes in naturally colonised infants in a rural African setting during the first year of life

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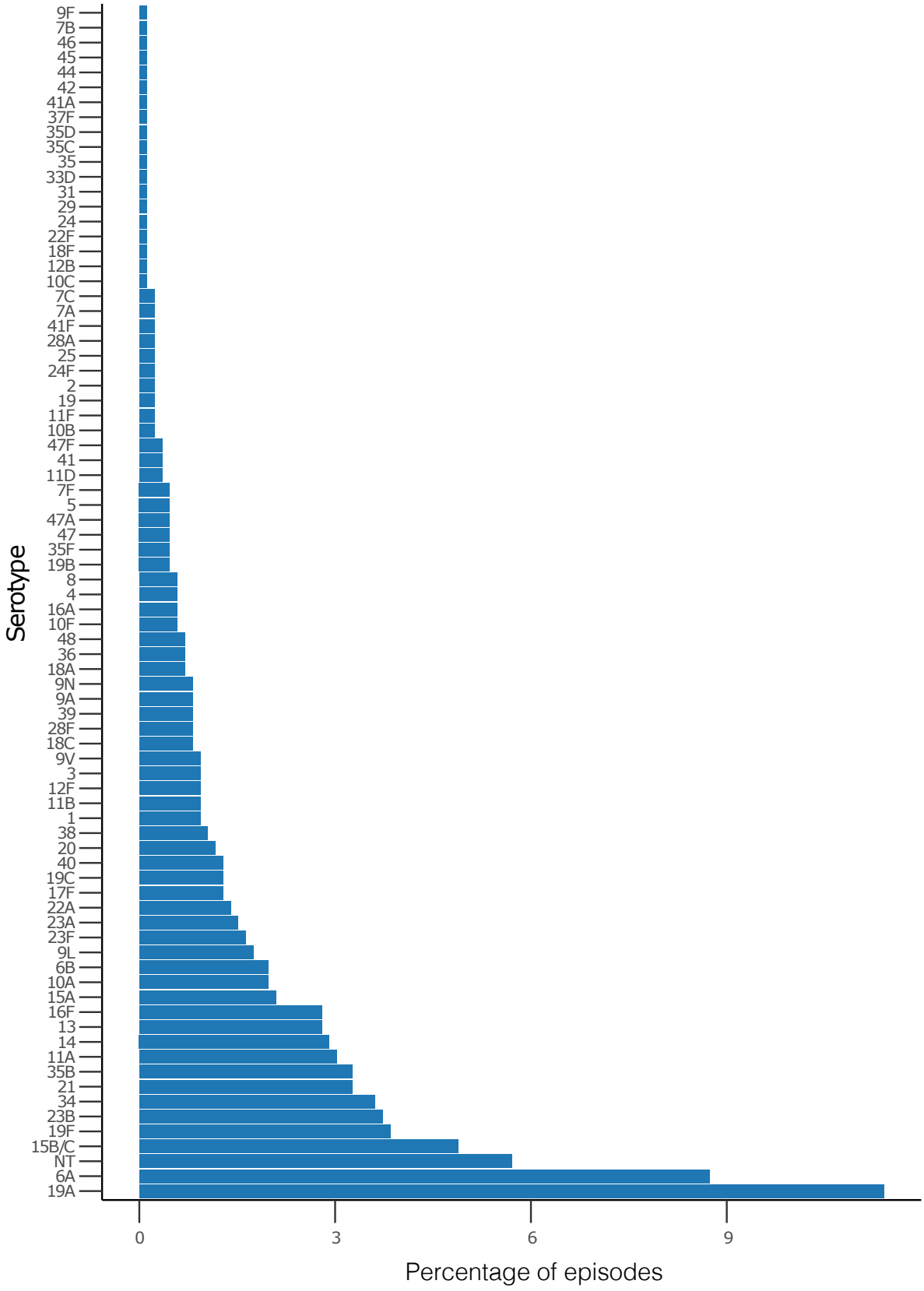
Supplementary Table 1. Clearance and acquisition rates of pneumococcal serotypes in the Gambian infants.

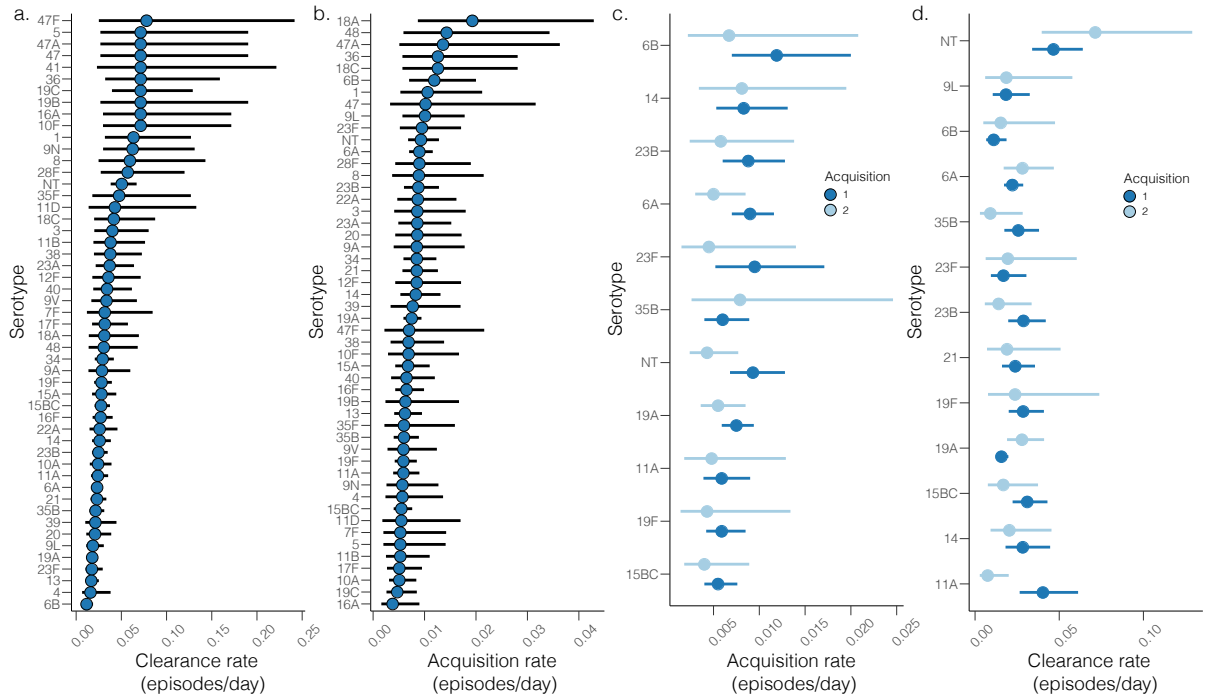
Serotype	Clearance rate (per day)			Time from birth to first acquisition in days (95% CI)	Time from birth to reacquisition in days (95% CI)
	All episodes (95% CI)	First episode (95% CI)	Second episode (95% CI)		
6B	0.0116 (0.0072,0.0187)	0.0111 (0.0066,0.0187)	0.0153 (0.0049,0.0475)	0.0119 (0.007,0.02)	0.0067 (0.0022,0.0208)
4	0.0159 (0.0066,0.0381)	0.0159 (0.0066,0.0381)	–	0.0057 (0.0024,0.0136)	–
13	0.0168 (0.0113,0.0251)	0.0175 (0.0115,0.0265)	–	0.0062 (0.0041,0.0095)	–
23F	0.0174 (0.0103,0.0294)	0.0169 (0.0094,0.0305)	0.0195 (0.0063,0.0604)	0.0095 (0.0052,0.0171)	0.0045 (0.0015,0.014)
19A	0.0178 (0.0146,0.0217)	0.0157 (0.0125,0.0198)	0.0279 (0.019,0.041)	0.0075 (0.0059,0.0094)	0.0055 (0.0036,0.0085)
9L	0.0185 (0.0111,0.0306)	0.0184 (0.0105,0.0325)	0.0186 (0.006,0.0578)	0.0101 (0.0057,0.0178)	–
20	0.0209 (0.0112,0.0388)	0.0177 (0.0089,0.0354)	–	0.0086 (0.0043,0.0172)	–
39	0.0213 (0.0101,0.0446)	0.026 (0.0117,0.0578)	–	0.0077 (0.0034,0.017)	–
35B	0.0215 (0.0148,0.0311)	0.0257 (0.0174,0.038)	0.0091 (0.0029,0.0283)	0.006 (0.004,0.0089)	0.0079 (0.0026,0.0246)
21	0.0231 (0.0159,0.0334)	0.0239 (0.016,0.0356)	0.019 (0.0071,0.0508)	0.0085 (0.0057,0.0126)	–
6A	0.0232 (0.0185,0.0291)	0.0222 (0.0172,0.0286)	0.0282 (0.017,0.0468)	0.009 (0.007,0.0116)	0.005 (0.003,0.0085)
11A	0.0241 (0.0164,0.0354)	0.0403 (0.0265,0.0612)	0.0075 (0.0028,0.02)	0.0059 (0.0039,0.009)	0.0048 (0.0018,0.0129)
10A	0.0243 (0.0151,0.0391)	0.0223 (0.0135,0.037)	–	0.0051 (0.0031,0.0084)	–
23B	0.0247 (0.0175,0.0349)	0.0288 (0.0197,0.042)	0.014 (0.0058,0.0336)	0.0088 (0.006,0.0128)	0.0058 (0.0024,0.0138)
22A	0.026 (0.0148,0.0457)	0.0286 (0.0154,0.0531)	–	0.0087 (0.0047,0.0162)	–
14	0.026 (0.0176,0.0384)	0.0284 (0.0181,0.0446)	0.0204 (0.0092,0.0454)	0.0083 (0.0053,0.0131)	0.0081 (0.0034,0.0195)
16F	0.0271 (0.0182,0.0404)	0.0336 (0.0221,0.051)	–	0.0065 (0.0043,0.0099)	–
15B/C	0.0276 (0.0204,0.0374)	0.031 (0.0223,0.043)	0.0168 (0.0076,0.0374)	0.0055 (0.004,0.0076)	0.004 (0.0018,0.0089)
15A	0.028 (0.0176,0.0444)	0.0337 (0.021,0.0543)	–	0.0068 (0.0043,0.011)	–
19F	0.0281 (0.0199,0.0395)	0.0286 (0.02,0.0409)	0.0238 (0.0077,0.0738)	0.0059 (0.0042,0.0085)	0.0043 (0.0014,0.0134)
9A	0.0286 (0.0136,0.0599)	0.0286 (0.0136,0.0599)	–	0.0085 (0.004,0.0178)	–
34	0.0293 (0.0206,0.0417)	0.0282 (0.0196,0.0406)	–	0.0085 (0.0059,0.0123)	–
48	0.0306 (0.0138,0.0681)	0.0275 (0.0114,0.066)	–	0.0143 (0.0059,0.0343)	–
18A	0.0312 (0.014,0.0694)	0.0312 (0.014,0.0694)	–	0.0193 (0.0087,0.0429)	–
7F	0.0317 (0.0119,0.0846)	0.0317 (0.0119,0.0846)	–	0.0053 (0.002,0.0142)	–
17F	0.0317 (0.0176,0.0573)	0.0314 (0.0169,0.0584)	–	0.0051 (0.0027,0.0095)	–
9V	0.0336 (0.0168,0.0672)	0.0313 (0.0149,0.0656)	–	0.0059 (0.0028,0.0124)	–
40	0.0342 (0.0189,0.0617)	0.0325 (0.0175,0.0603)	–	0.0065 (0.0035,0.012)	–
12F	0.0357 (0.0179,0.0714)	0.0357 (0.0179,0.0714)	–	0.0085 (0.0043,0.0171)	–
23A	0.0371 (0.0216,0.064)	0.0357 (0.0203,0.0629)	–	0.0086 (0.0049,0.0152)	–
38	0.0378 (0.0197,0.0727)	0.0408 (0.0204,0.0816)	–	0.0069 (0.0034,0.0138)	–
11B	0.0381 (0.0191,0.0762)	0.0357 (0.017,0.0749)	–	0.0053 (0.0025,0.011)	–
3	0.0401 (0.0201,0.0802)	0.0571 (0.0272,0.1199)	–	0.0086 (0.0041,0.018)	–
18C	0.0417 (0.0199,0.0874)	0.039 (0.0175,0.0867)	–	0.0126 (0.0057,0.0281)	–
11D	0.0429 (0.0138,0.1329)	0.0429 (0.0138,0.1329)	–	0.0055 (0.0018,0.017)	–
35F	0.0476 (0.0179,0.1269)	0.0476 (0.0179,0.1269)	–	0.006 (0.0022,0.0159)	–

NT	0.0505 (0.0382,0.0669)	0.0466 (0.0339,0.064)	0.0714 (0.0396,0.129)	0.0093 (0.0068,0.0128)	0.0043 (0.0024,0.0077)
28F	0.0571 (0.0272,0.1199)	0.0571 (0.0272,0.1199)	–	0.009 (0.0043,0.019)	–
8	0.0595 (0.0248,0.143)	0.0595 (0.0248,0.143)	–	0.0089 (0.0037,0.0215)	–
9N	0.0625 (0.0298,0.1311)	0.0612 (0.0275,0.1363)	–	0.0057 (0.0026,0.0127)	–
1	0.0635 (0.0318,0.127)	0.0635 (0.0318,0.127)	–	0.0106 (0.0053,0.0212)	–
41	0.0714 (0.023,0.2215)	–	–	–	–
19B	0.0714 (0.0268,0.1903)	0.0714 (0.0268,0.1903)	–	0.0063 (0.0024,0.0167)	–
47	0.0714 (0.0268,0.1903)	0.0714 (0.023,0.2215)	–	0.0102 (0.0033,0.0316)	–
47A	0.0714 (0.0268,0.1903)	0.0714 (0.0268,0.1903)	–	0.0136 (0.0051,0.0363)	–
5	0.0714 (0.0268,0.1903)	0.0714 (0.0268,0.1903)	–	0.0053 (0.002,0.0141)	–
10F	0.0714 (0.0297,0.1716)	0.0714 (0.0297,0.1716)	–	0.0069 (0.0029,0.0167)	–
16A	0.0714 (0.0297,0.1716)	0.0714 (0.0297,0.1716)	–	0.0038 (0.0016,0.009)	–
36	0.0714 (0.0321,0.159)	0.0714 (0.0321,0.159)	–	0.0126 (0.0057,0.0281)	–
19C	0.0714 (0.0396,0.129)	0.0714 (0.0396,0.129)	–	0.0047 (0.0026,0.0085)	–
47F	0.0779 (0.0251,0.2416)	0.0779 (0.0251,0.2416)	–	0.007 (0.0022,0.0216)	–

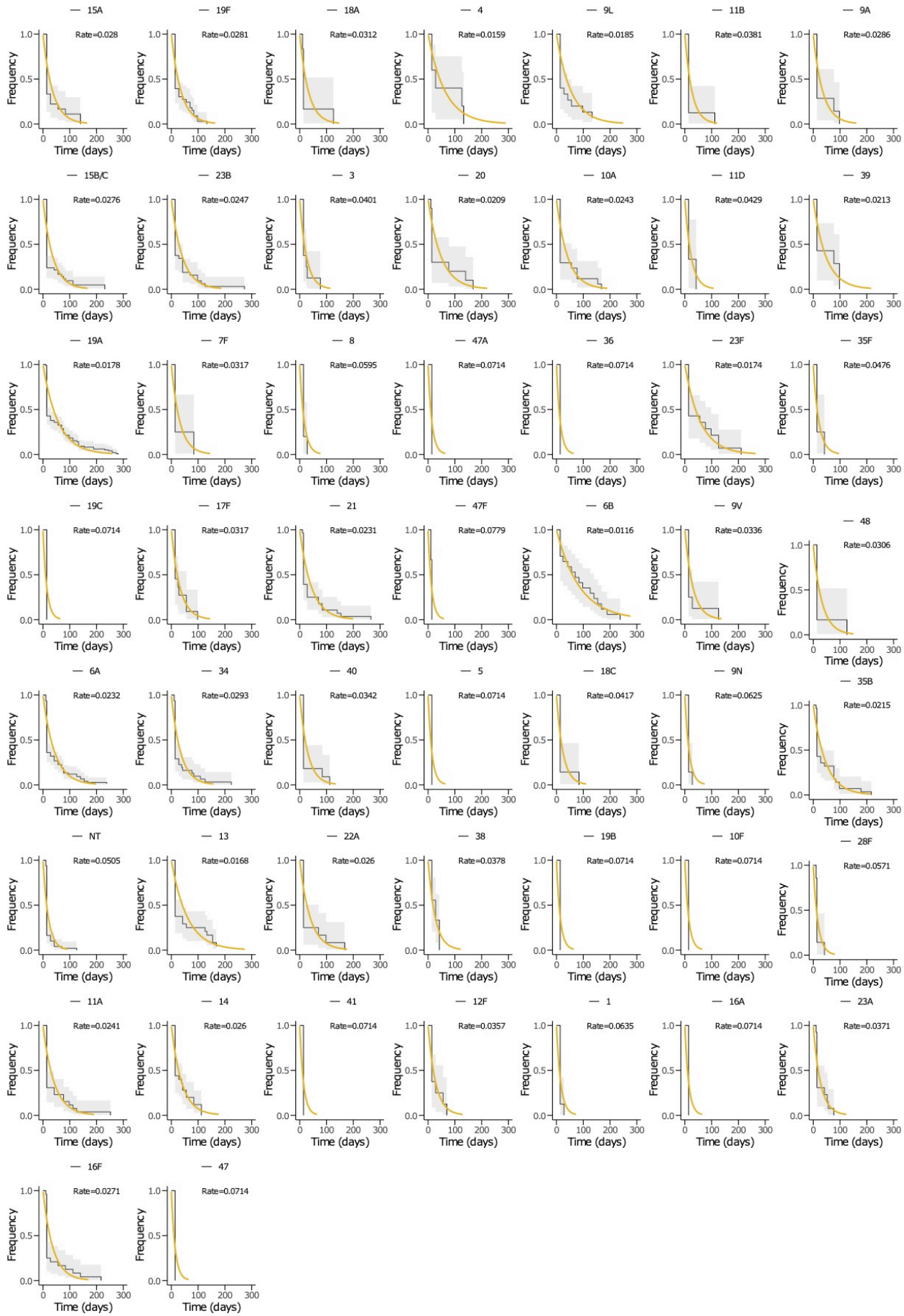
Cells marked by "–" designate serotypes where no or very few data were available for analysis.



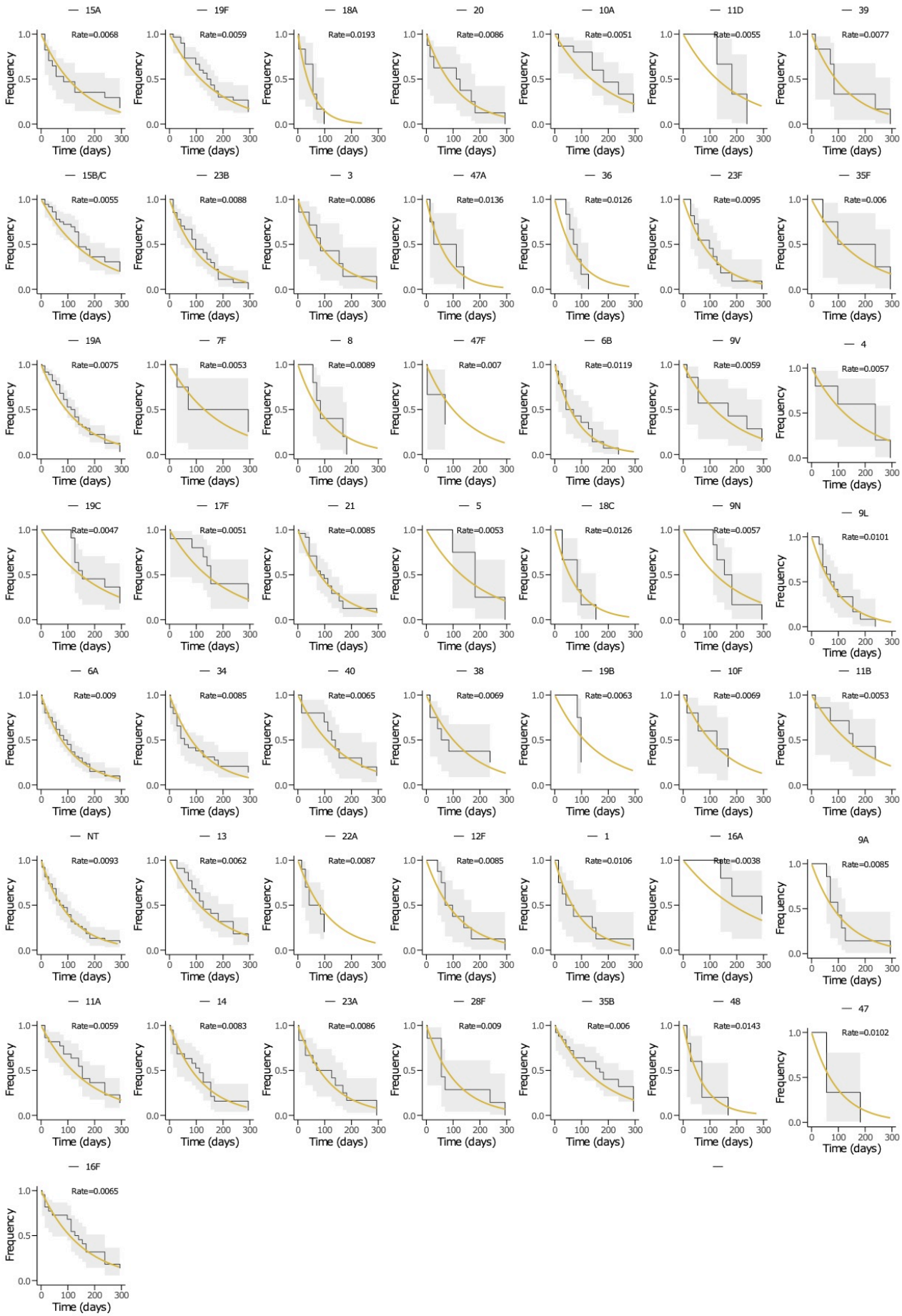
Supplementary Figure 1. Proportion of colonisation episodes associated with each serotype.



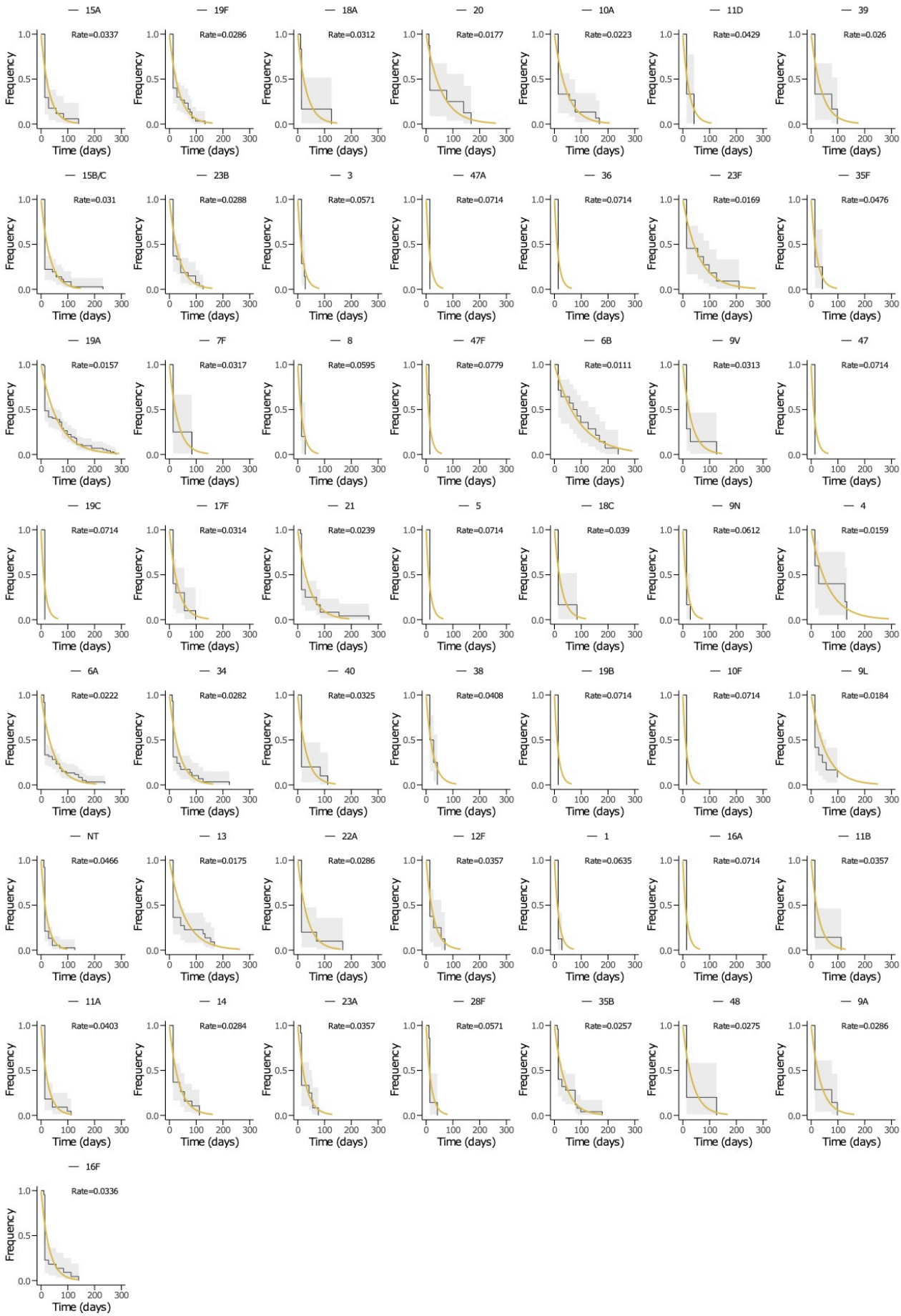
Supplementary Figure 2. Clearance and acquisition rates of pneumococcal serotypes in Gambian infants. Graph showing **(a)** clearance rate, **(b)** initial acquisition rate of serotypes, **(b)** acquisition rate of the second serotype, **(c)** rates of acquisition of a serotype for the first and second episode and **(d)** clearance rates of the first and second episode of a serotype.


15A Rate=0.028
19F Rate=0.0281
18A Rate=0.0312
4 Rate=0.0159
9L Rate=0.0185
11B Rate=0.0381
9A Rate=0.0286
15B/C Rate=0.0276
23B Rate=0.0247
3 Rate=0.0401
20 Rate=0.0209
10A Rate=0.0243
11D Rate=0.0429
39 Rate=0.0213
19A Rate=0.0178
7F Rate=0.0317
8 Rate=0.0595
47A Rate=0.0714
36 Rate=0.0714
23F Rate=0.0174
35F Rate=0.0476
19C Rate=0.0714
17F Rate=0.0317
21 Rate=0.0231
47F Rate=0.0779
6B Rate=0.0116
9V Rate=0.0336
48 Rate=0.0306
6A Rate=0.0232
34 Rate=0.0293
40 Rate=0.0342
5 Rate=0.0714
18C Rate=0.0417
9N Rate=0.0625
35B Rate=0.0215
NT Rate=0.0505
13 Rate=0.0168
22A Rate=0.026
38 Rate=0.0378
19B Rate=0.0714
10F Rate=0.0714
28F Rate=0.0571
11A Rate=0.0241
14 Rate=0.026
41 Rate=0.0714
12F Rate=0.0357
1 Rate=0.0635
16A Rate=0.0714
23A Rate=0.0371
16F Rate=0.0271
47 Rate=0.0714
Frequency
Time (days)

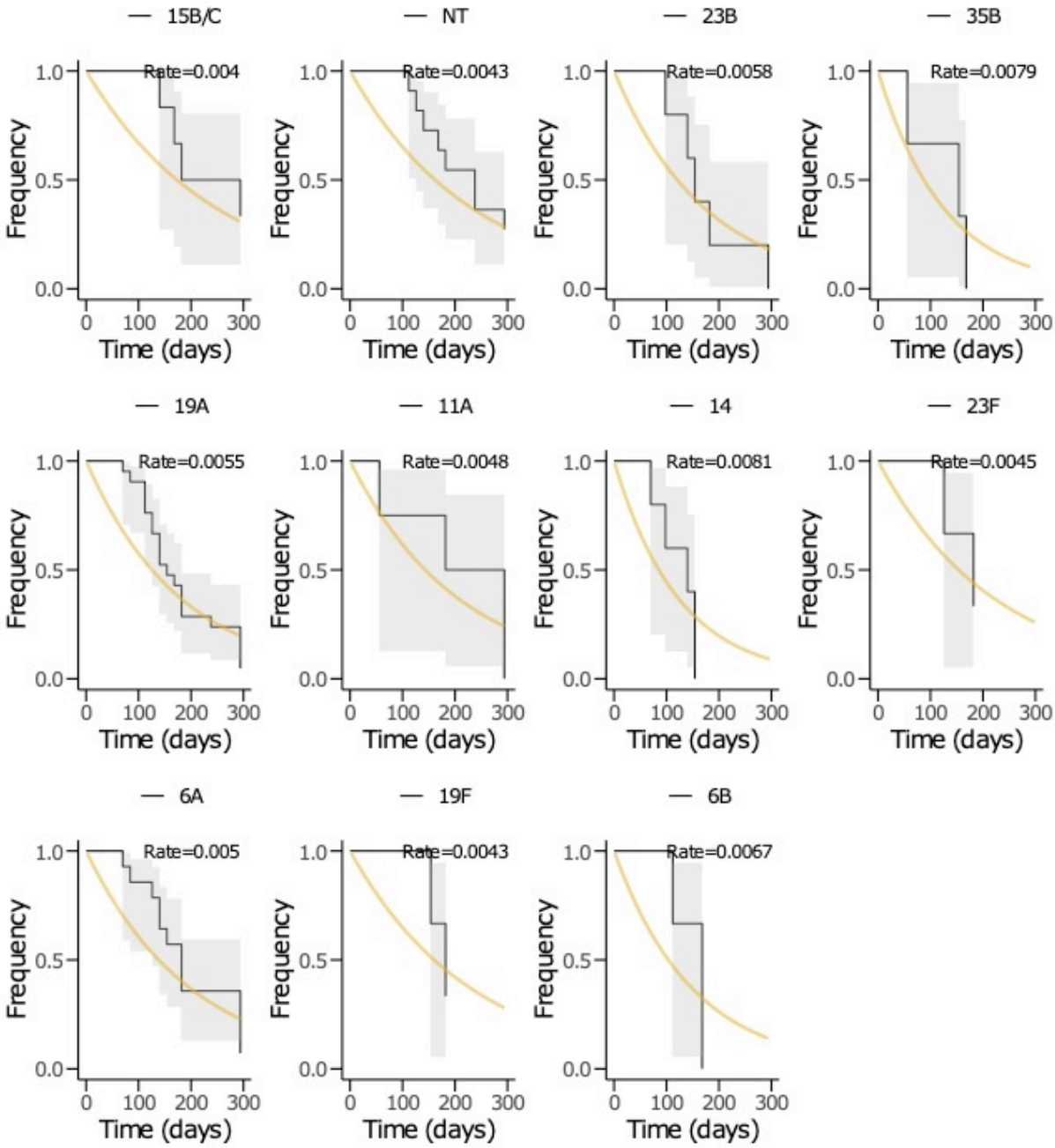
Supplementary Figure 3. The Kaplan-Meier survival curves and exponential fit to the carriage duration data of each serotype. The plots show the overall duration from acquisition to clearance of each serotypes regardless of acquisition time. The black curve represents the Kaplan-Meier estimates while the yellow line is the fitted survival curve. The rate parameter in the exponential model is shown at the top of each plot represents the mean clearance rate whose inverse equates to mean the carriage duration.


15A Rate=0.0068
19F Rate=0.0059
18A Rate=0.0193
20 Rate=0.0086
10A Rate=0.0051
11D Rate=0.0055
39 Rate=0.0077
15B/C Rate=0.0055
23B Rate=0.0088
3 Rate=0.0086
47A Rate=0.0136
36 Rate=0.0126
23F Rate=0.0095
35F Rate=0.006
19A Rate=0.0075
7F Rate=0.0053
8 Rate=0.0089
47F Rate=0.007
6B Rate=0.0119
9V Rate=0.0059
4 Rate=0.0057
19C Rate=0.0047
17F Rate=0.0051
21 Rate=0.0085
5 Rate=0.0053
18C Rate=0.0126
9N Rate=0.0057
9L Rate=0.0101
6A Rate=0.009
34 Rate=0.0085
40 Rate=0.0065
38 Rate=0.0069
19B Rate=0.0063
10F Rate=0.0069
11B Rate=0.0053
NT Rate=0.0093
13 Rate=0.0062
22A Rate=0.0087
12F Rate=0.0085
1 Rate=0.0106
16A Rate=0.0038
9A Rate=0.0085
11A Rate=0.0059
14 Rate=0.0083
23A Rate=0.0086
28F Rate=0.009
35B Rate=0.006
48 Rate=0.0143
47 Rate=0.0102
16F Rate=0.0065
Frequency
Time (days)

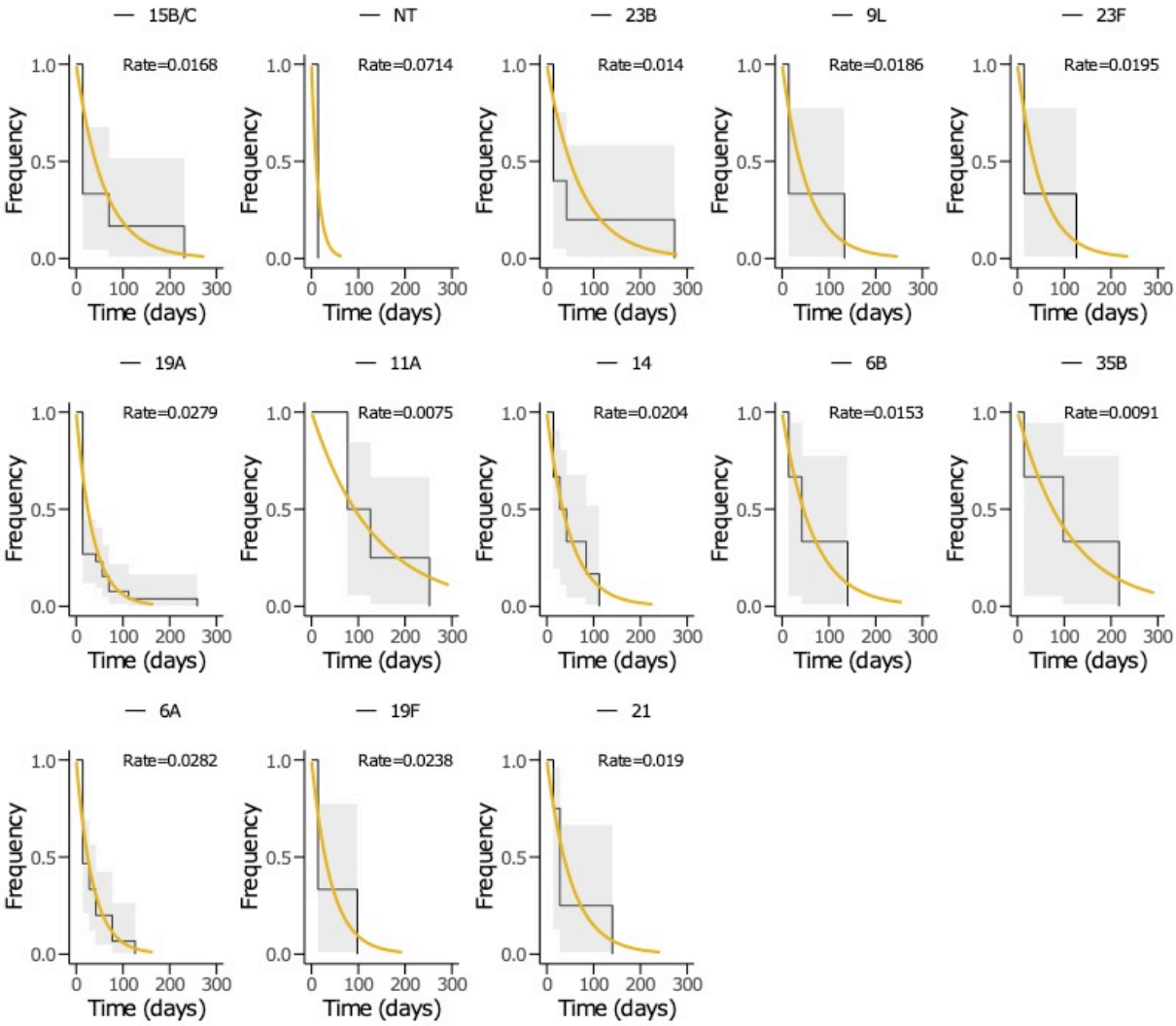
Supplementary Figure 4. The Kaplan-Meier survival curves and exponential fit to the time to first acquisition data of each serotype. The plots show duration from birth of an infant to first acquisition of each serotype. The black curve represents the Kaplan-Meier estimates while the yellow line is the fitted survival curve. The rate parameter in the exponential model is shown at the top of each plot represents the mean acquisition rate whose inverse equates to mean the time to first acquisition of each serotype.


15A Rate=0.0337
19F Rate=0.0286
18A Rate=0.0312
20 Rate=0.0177
10A Rate=0.0223
11D Rate=0.0429
39 Rate=0.026
15B/C Rate=0.031
23B Rate=0.0288
3 Rate=0.0571
47A Rate=0.0714
36 Rate=0.0714
23F Rate=0.0169
35F Rate=0.0476
19A Rate=0.0157
7F Rate=0.0317
8 Rate=0.0595
47F Rate=0.0779
6B Rate=0.0111
9V Rate=0.0313
47 Rate=0.0714
19C Rate=0.0714
17F Rate=0.0314
21 Rate=0.0239
5 Rate=0.0714
18C Rate=0.039
9N Rate=0.0612
4 Rate=0.0159
6A Rate=0.0222
34 Rate=0.0282
40 Rate=0.0325
38 Rate=0.0408
19B Rate=0.0714
10F Rate=0.0714
9L Rate=0.0184
NT Rate=0.0466
13 Rate=0.0175
22A Rate=0.0286
12F Rate=0.0357
1 Rate=0.0635
16A Rate=0.0714
11B Rate=0.0357
11A Rate=0.0403
14 Rate=0.0284
23A Rate=0.0357
28F Rate=0.0571
35B Rate=0.0257
48 Rate=0.0275
9A Rate=0.0286
16F Rate=0.0336
Frequency
Time (days)

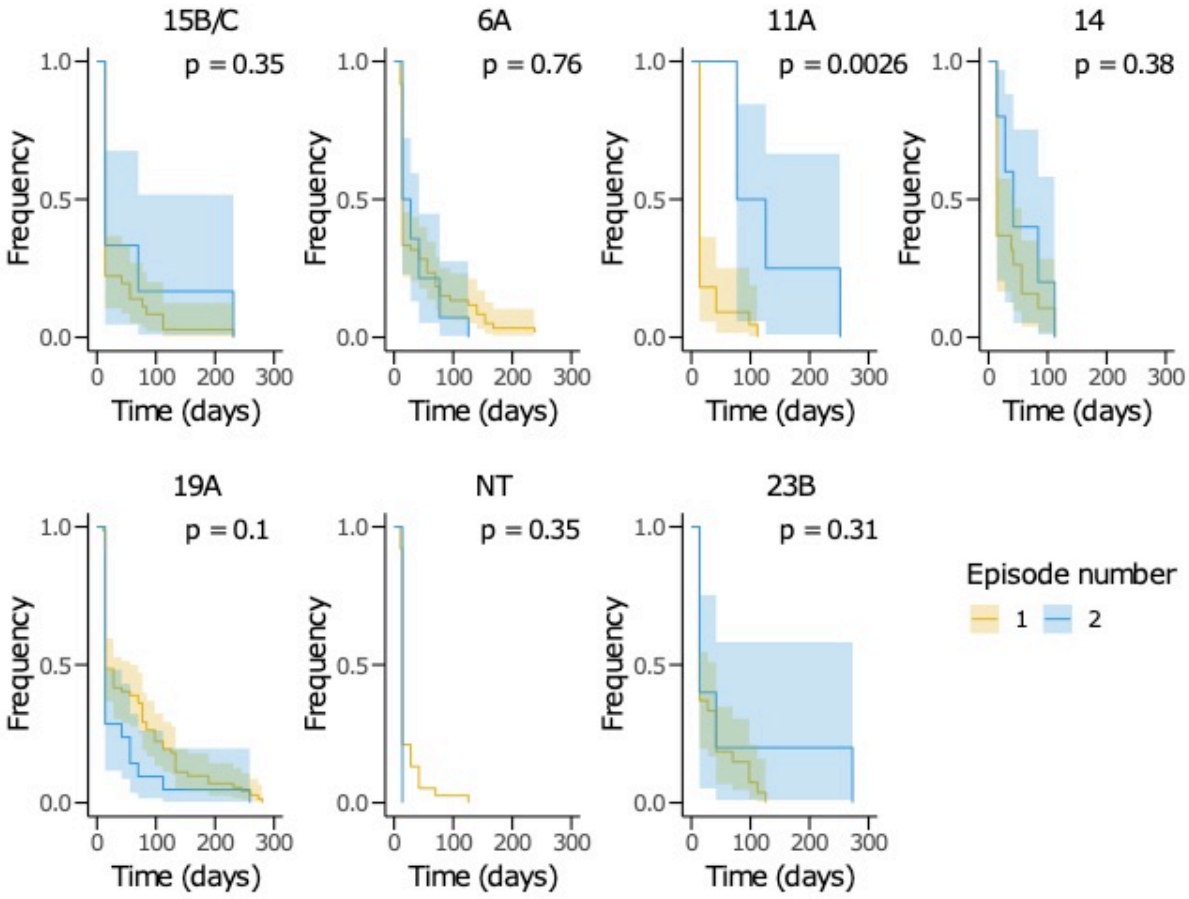
Supplementary Figure 5. The Kaplan-Meier survival curves and exponential fit to the carriage duration data after first acquisition for each serotype. The plots show duration from first acquisition until clearance of each serotype. The black curve represents the Kaplan-Meier estimates while the yellow line is the fitted survival curve. The rate parameter in the exponential model is shown at the top of each plot represents the mean clearance rate after first episode whose inverse equates to mean the time to acquisition of each serotype.



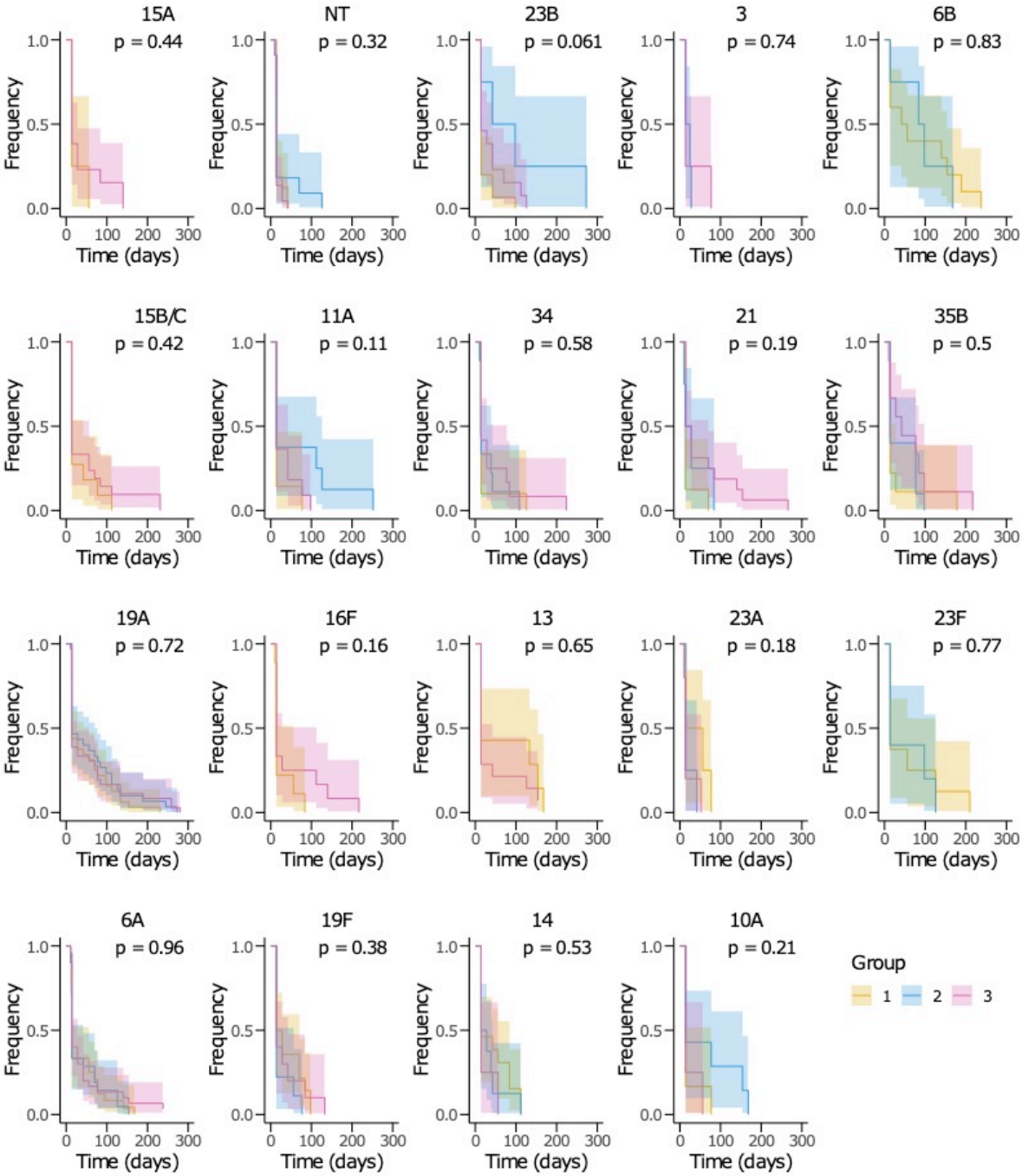
Supplementary Figure 6. The Kaplan-Meier survival curves and exponential fit to the time to second acquisition or reacquisition data for each serotype. The plots show duration from birth of an infant until second acquisition of each serotype. The black curve represents the Kaplan-Meier estimates while the yellow line is the fitted survival curve. The rate parameter in the exponential model is shown at the top of each plot represents the mean reacquisition rate after whose inverse equates to mean the time to reacquisition of each serotype.



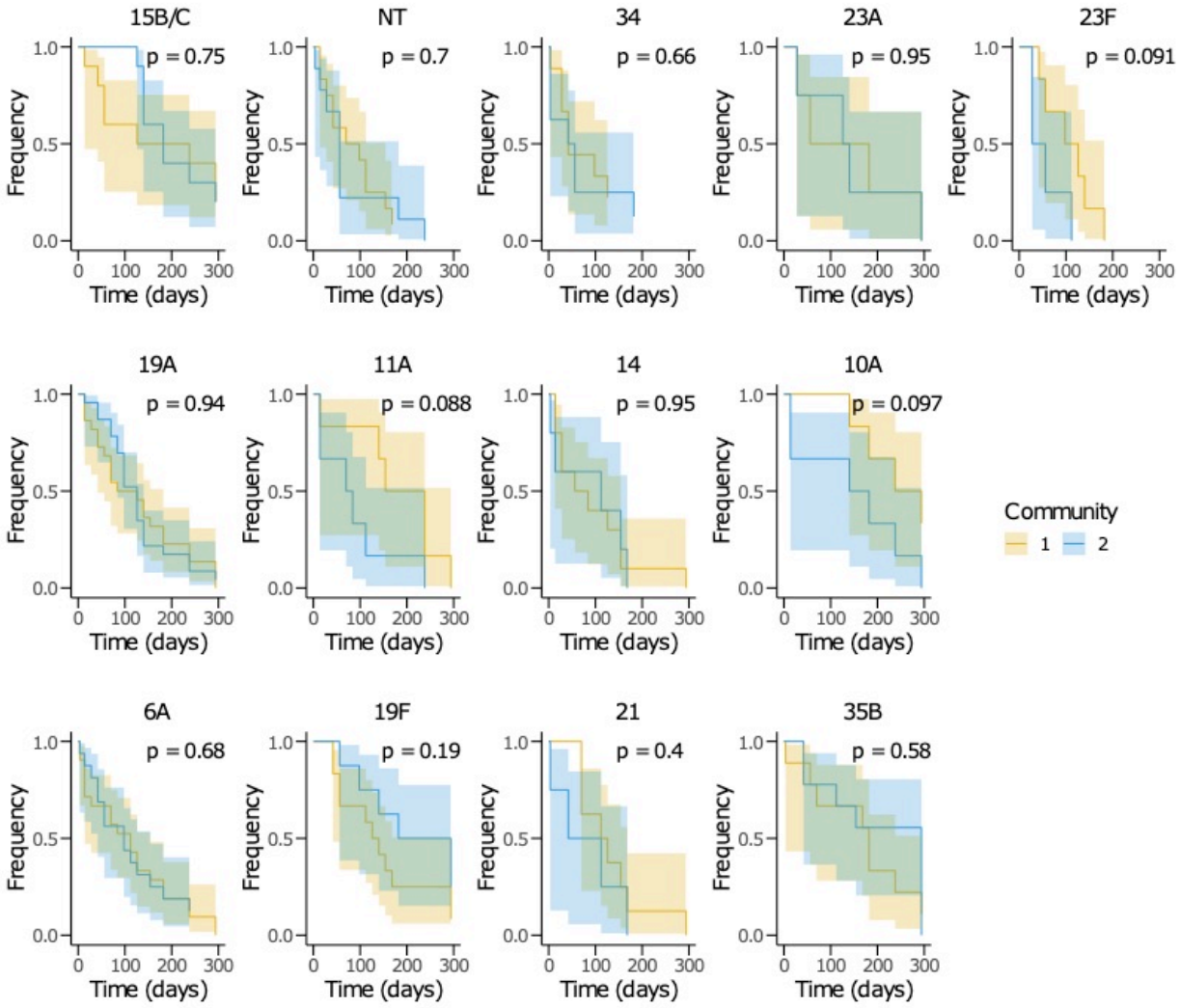
Supplementary Figure 7. The Kaplan-Meier survival curves and exponential fit to the carriage duration data after second acquisition or reacquisition for each serotype. The plots show duration from first acquisition until clearance of each serotype. The black curve represents the Kaplan-Meier estimates while the yellow line is the fitted survival curve. The rate parameter in the exponential model is shown at the top of each plot represents the mean clearance rate after first episode whose inverse equates to mean the time to acquisition of each serotype.



Supplementary Figure 8. The Kaplan-Meier survival curves comparing the carriage duration of the first episode and second episode of serotypes acquired multiple times. The *P*-values were calculated using the log-rank test.



Supplementary Figure 9. The Kaplan-Meier survival curves comparing the carriage duration for each serotype in different communities. The infants in group 1 were from PCV-unexposed (unvaccinated) communities and received PCV7 after 6 months. The infants in group 2 were also from PCV-unexposed (unvaccinated) communities where the infants received PCV7 at 2, 3 and 4 months. The infants from group 3 originated from PCV-exposed (vaccinated) communities and they received PCV7 at 2, 3 and 4 months. The *P*-values were calculated using the log-rank test. Only serotypes found in both communities in >3 colonisation episodes are shown in the figure.



Supplementary Figure 10. The Kaplan-Meier survival curves comparing the time to acquisition for each serotype in different communities. The infants in community 1 were from PCV-unexposed (unvaccinated) villages and received PCV7 after 6 months. The infants in community 2 were also from PCV-unexposed (unvaccinated) villages where the infants received PCV7 at 2, 3 and 4 months. The infants from community 3 originated from PCV-exposed (vaccinated) villages and they received PCV7 at 2, 3 and 4 months. The *P*-values were calculated using the log-rank test. Only serotypes found in both communities in >3 colonisation episodes are shown in the figure.