**Text S2**

For children at *9 weeks*, the estimated prevalence based on the LMM is 38.0%.

One would expect the following percentage of **true** positives:

38.0% \* (1 – (1-.820)\*(1-.941)\*(1-.726)) = 38.0% \* 0.99709 = 37.9%

where 0.820, 0.941 and 0.726 are the estimated sensitivities of two KK measurements from days 1, 2 and 3, respectively

One would expect the following percentage of **false** positives:

(100% - 38.0%) \* (1 –.876\*.904\*.800) = 62.0% \* 0.366477 = 22.7%

where 0.876, 0.904 and 0.800 are the estimated specificities of two KK measurements from days 1, 2 and 3, respectively.

Thus, based on the estimated sensitivities, specificities and the assumption that results from days 1, 2 and 3 were independent, conditional on the true status, the LMM predicts that the estimated prevalence based on 6 KK measurements would be **60.6%** (37.9% true positive and 22.7% false positives). This is highly consistent with the estimate obtained from the 6 KK measurements: **62.1%.**

For children at *2 years*, the estimated prevalence based on the LMM is 67.9%.

One would expect the following percentage of **true** positives:

67.9% \* (1 - (1-.990)\*(1-.938)\*(1-.96)) = 67.9% \* 0.999975 = 67.9%

where 0.990, 0.938 and 0.960 are the estimated sensitivities of two KK measurements from days 1, 2 and 3, respectively

One would expect the following percentage of **false** positives:

(100% - 67.9%) \* (1 -.715\*.641\*.709) = 32.1% \* 0.675005 = 21.7%

where 0.751, 0.641 and 0.709 are the estimated specificities of two KK measurements from days 1, 2 and 3, respectively.

Thus, based on the estimated sensitivities, specificities and the assumption that results from days 1, 2 and 3 were independent, conditional on the true status, the LMM predicts that the estimated prevalence based on 6 KK measurements would be **89.6%** (67.9% true positive and 21.7% false positives). This is highly consistent with the estimate obtained from the 6 KK measurements: **90.8%.**

Similarly for adolescents and adults at *baseline***,** the estimated prevalence based on the LMM is 72.9%.

One would expect the following percentage of **true** positives:

72.9% \* (1 - (1-.940)\*(1-.927)\*(1-.954)) = 72.9% \* 0.999979 = 72.9%

where 0.940, 0.927 and 0.954 are the estimated sensitivities of two KK measurements from days 1, 2 and 3, respectively

One would expect the following percentage of **false** positives:

(100% - 72.9%) \* (1 -.815\*.858\*.859) = 27.1% \* 0.399327 = 10.8%

where 0.815, 0.858 and 0.859 are the estimated specificities of two KK measurements from days 1, 2 and 3, respectively.

Thus, based on the estimated sensitivities, specificities and the assumption that results from days 1, 2 and 3 were independent, conditional on the true status, the LMM predicts that the estimated prevalence based on 6 KK measurements would be **83.7.%** (72.9% true positive and 10.8% false positives). This is highly consistent with the estimate obtained from the 6 KK measurements: **83.9%.**

For adolescents and adults at *9 weeks*, the estimated prevalence based on the LMM is 22.5%.

One would expect the following percentage of **true** positives:

22.5% \* (1 - (1-.497)\*(1-.600)\*(1-.541)) = 22.5% \* 0.907649 = 20.4%

where 0.497, 0.600 and 0.541 are the estimated sensitivities of two KK measurements from days 1, 2 and 3, respectively

One would expect the following percentage of **false** positives:

(100% - 22.5%) \* (1 -.956\*.987\*.957) = 77.5% \* 0.097002 = 7.5%

where 0.956, 0.987 and 0.957 are the estimated specificities of two KK measurements from days 1, 2 and 3, respectively.

Thus, based on the estimated sensitivities, specificities and the assumption that results from days 1, 2 and 3 were independent, conditional on the true status, the LMM predicts that the estimated prevalence based on 6 KK measurements would be **27.9%** (20.4% true positive and 7.5% false positives). This is highly consistent with the estimate obtained from the 6 KK measurements: **30.0%.**

For adolescents and adults at *2 years*, the estimated prevalence based on the LMM is 31.3%.

One would expect the following percentage of **true** positives:

31.3% \* (1 - (1-.940)\*(1-.927)\*(1-.954)) = 31.3% \* 0.999799 = 31.3%

where 0.940, 0.927 and 0.954 are the estimated sensitivities of two KK measurements from days 1, 2 and 3, respectively

One would expect the following percentage of **false** positives:

(100% - 31.3%) \* (1 -.815\*.858\*.859) = 68.7% \* 0.399327 = 27.4%

where 0.815, 0.858 and 0.859 are the estimated specificities of two KK measurements from days 1, 2 and 3, respectively.

Thus, based on the estimated sensitivities, specificities and the assumption that results from days 1, 2 and 3 were independent, conditional on the true status, the LMM predicts that the estimated prevalence based on 6 KK measurements would be **58.7%** (31.3% true positive and 27.4% false positives). This is highly consistent with the estimate obtained from the 6 KK measurements: **56.5%.**