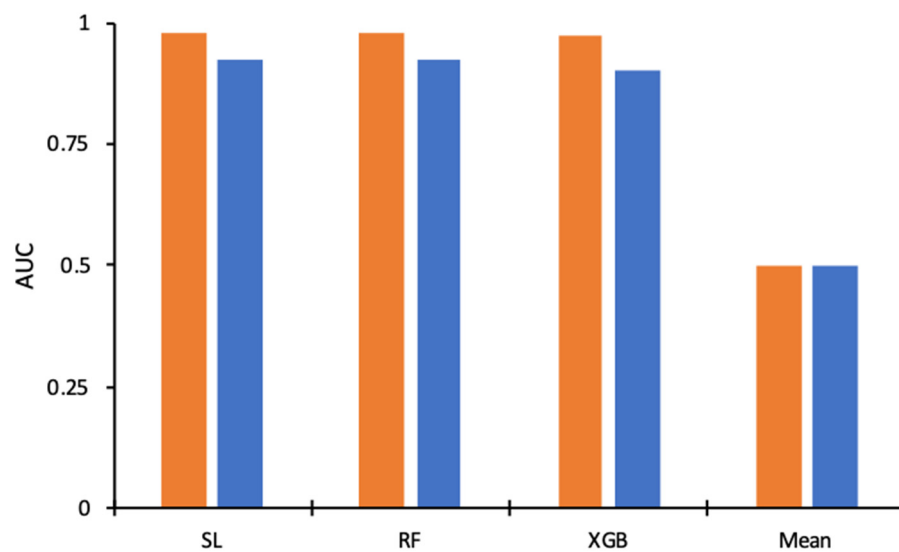**Supplementary Information**

Supplementary Information Figure S1 shows the CV-AUC values obtained from base learners as well as the superlearner. Supplementary Information Table S1 shows the coefficients for each base learner as estimated by the superlearner algorithm. In both the Democratic Republic of the Congo (COD) and Nigeria (NGA), random forest is the best performing base learner, with CV-AUC values nearly identical to the superlearner (0.9767 vs. 0.9778 and 0.9225 vs. 0.9230 in COD and NGA, respectively). Extreme gradient boosting also performs well in both settings, achieving CV-AUC values of 0.9739 and 0.9019 respectively. DeLong's test reveals that for COD, superlearner AUC values are significantly higher than random forest ($p < 0.00002$), but that for NGA the difference between superlearner and random forest AUC values are an order of magnitude smaller, and could be due to random chance ($p = 0.6568$).



**Supplementary Information Figure S1.** CV-AUC values obtained from each of the base learners and superlearner plotted in decreasing value of AUC for the Democratic Republic of the Congo (shown in orange) and Nigeria (blue). SL—superlearner, RF—random forest, XGB—extreme gradient boosting.

**Supplementary Information Table S1.** Coefficients estimated by the superlearner algorithm for each base learner.

| Base Learner | Democratic Republic of the Congo | Nigeria |
|---|---|---|
| Mean | 0 | 0.33 |
| XGB | 0.38 | 0.09 |
| RF | 0.62 | 0.58 |