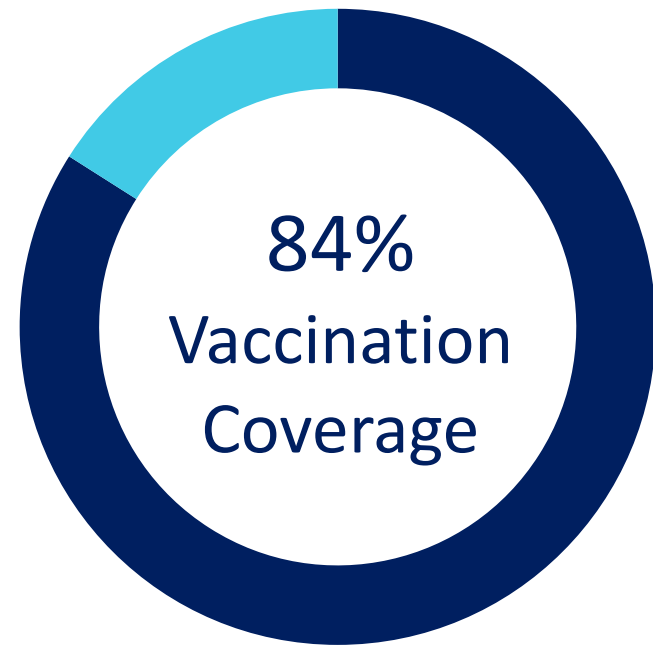


Uncovering Gaps in Vaccination Coverage Data

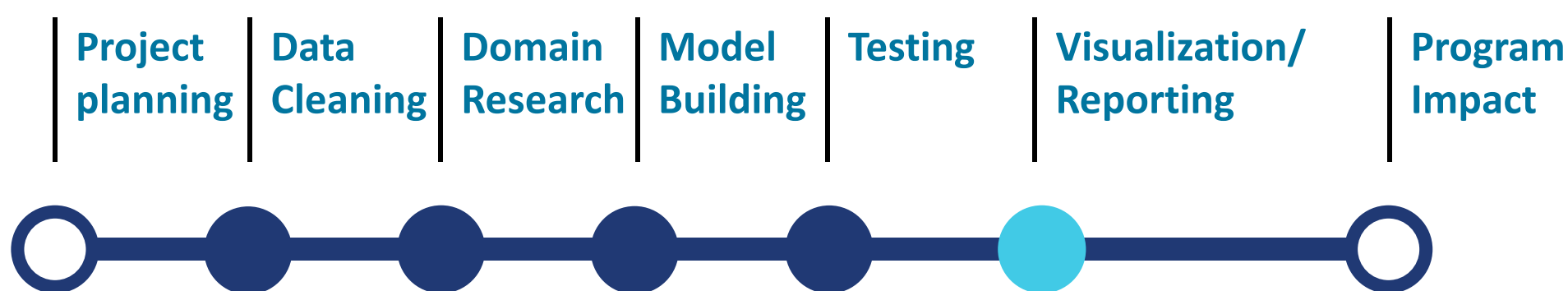
Global vaccine coverage is calculated in part by how well caregivers recall if their child received vaccines in household surveys. But it's easy to forget which vaccines your child has received. **Caregiver recall is only 53% accurate.**

We applied a combination of machine-learning algorithms to explore what predicts whether a caregiver will have their child's vaccine card using survey data from two countries.



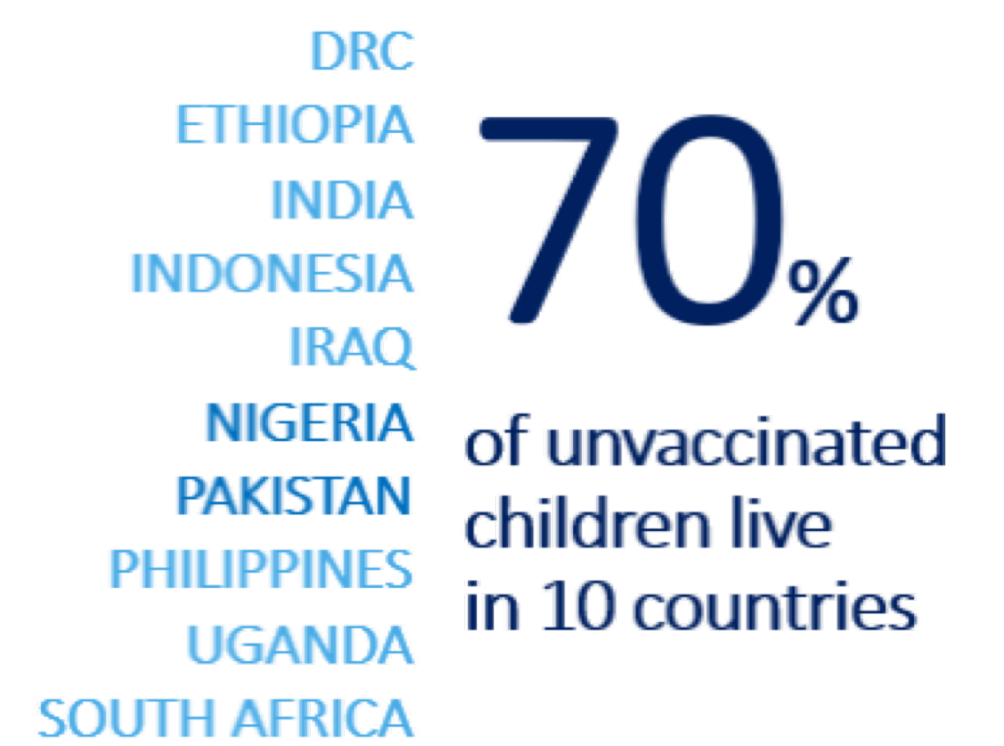
It is estimated that only 84% of the children receive the complete three doses of major vaccines, despite globally available coverage.¹

Our Process



Our analysis focuses on two GAVI-tier II countries: **Nigeria and Pakistan (Sindh Area).**

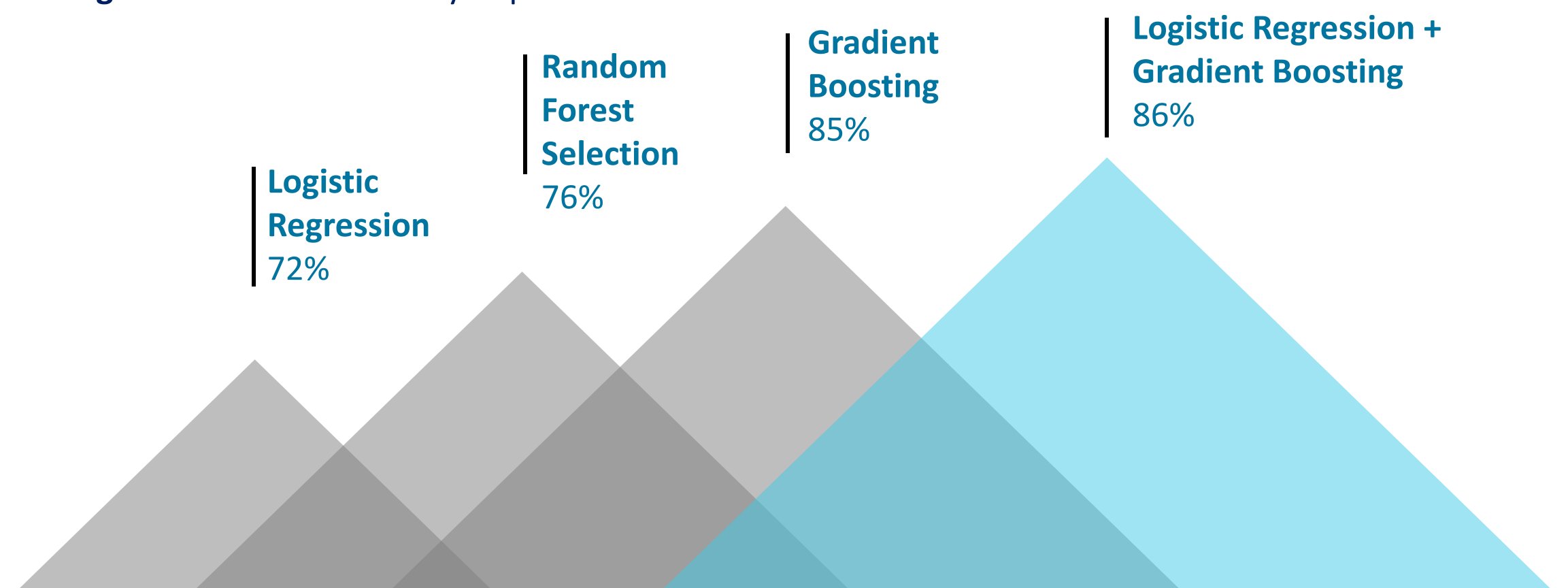
We collected and analyzed 2011 MICS survey data for these countries to test our models in areas with the highest need.



Our Prediction Models

We tested four different models and found the most success (86% accuracy) with an ensemble model combining logistic regression with gradient boosting (Figure 1.)

Figure 1. Relative accuracy of prediction models tested.



These Factors Predict Having a Vaccine Card

Nigeria



- Combined wealth score
- Birth certificate issued by local government
- Day of birth
- House has agricultural machinery
- Rural wealth score

Pakistan



- Child's sample weight
- Combined wealth score
- Water-lifting pump
- Height for age z-score
- Head of household education

Figure 2. Feature selection for Random Forest Classifier (A) and Gradient Boosting Decision Tree (B).

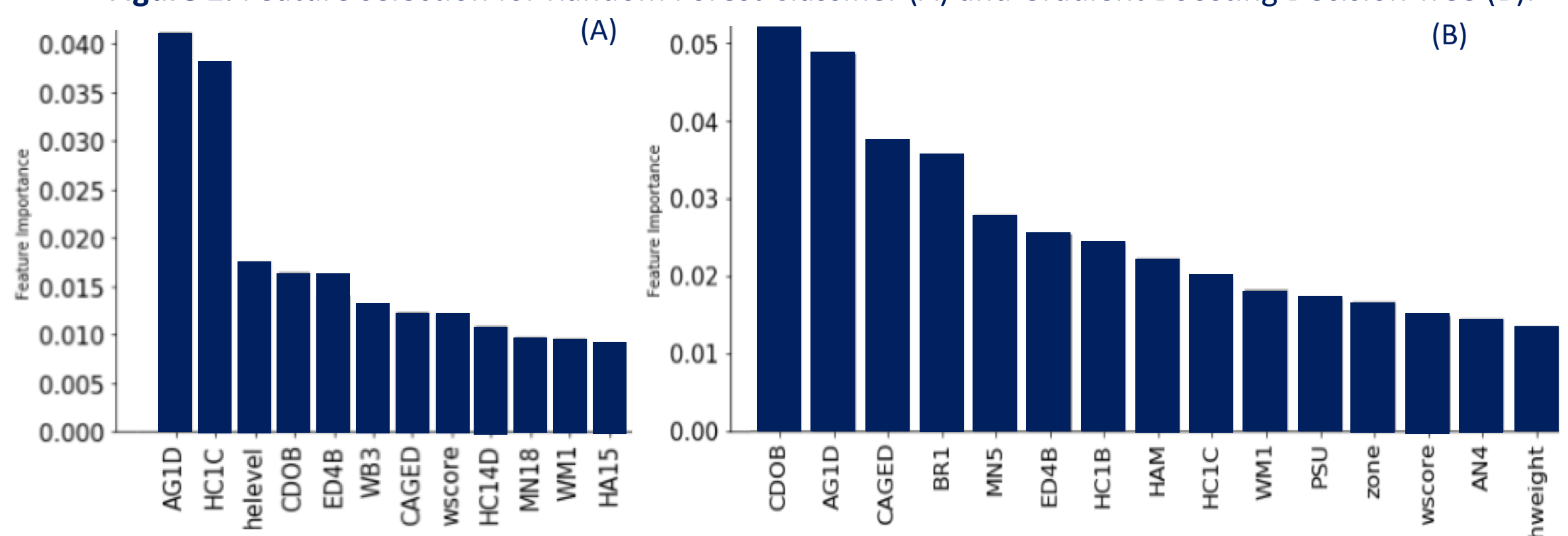
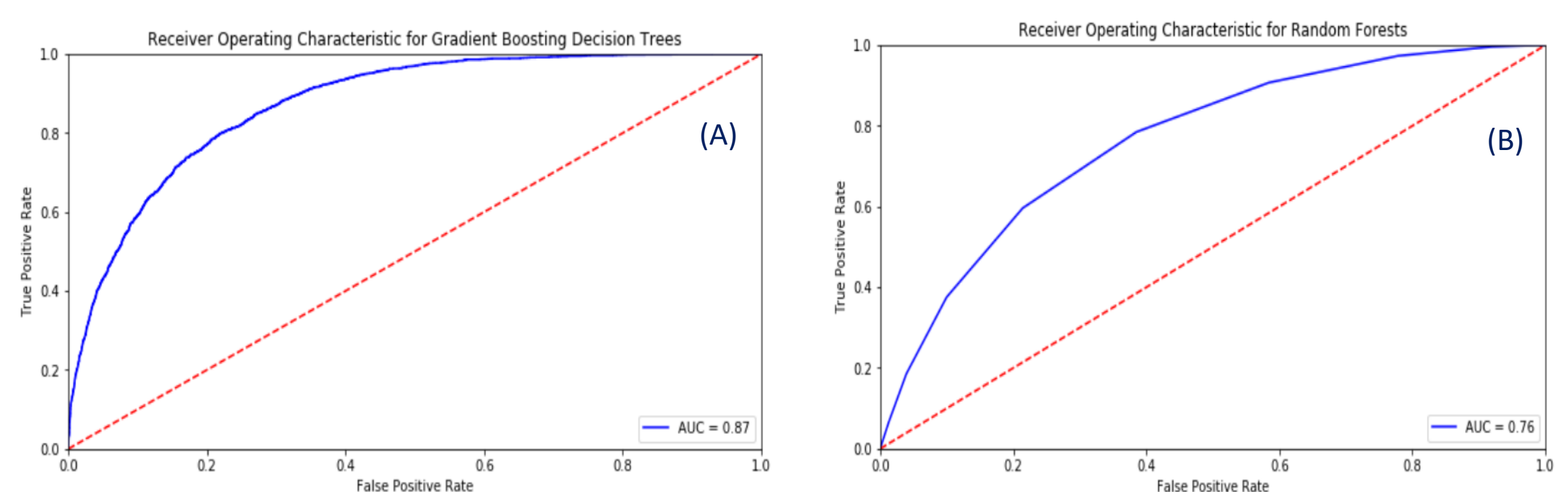


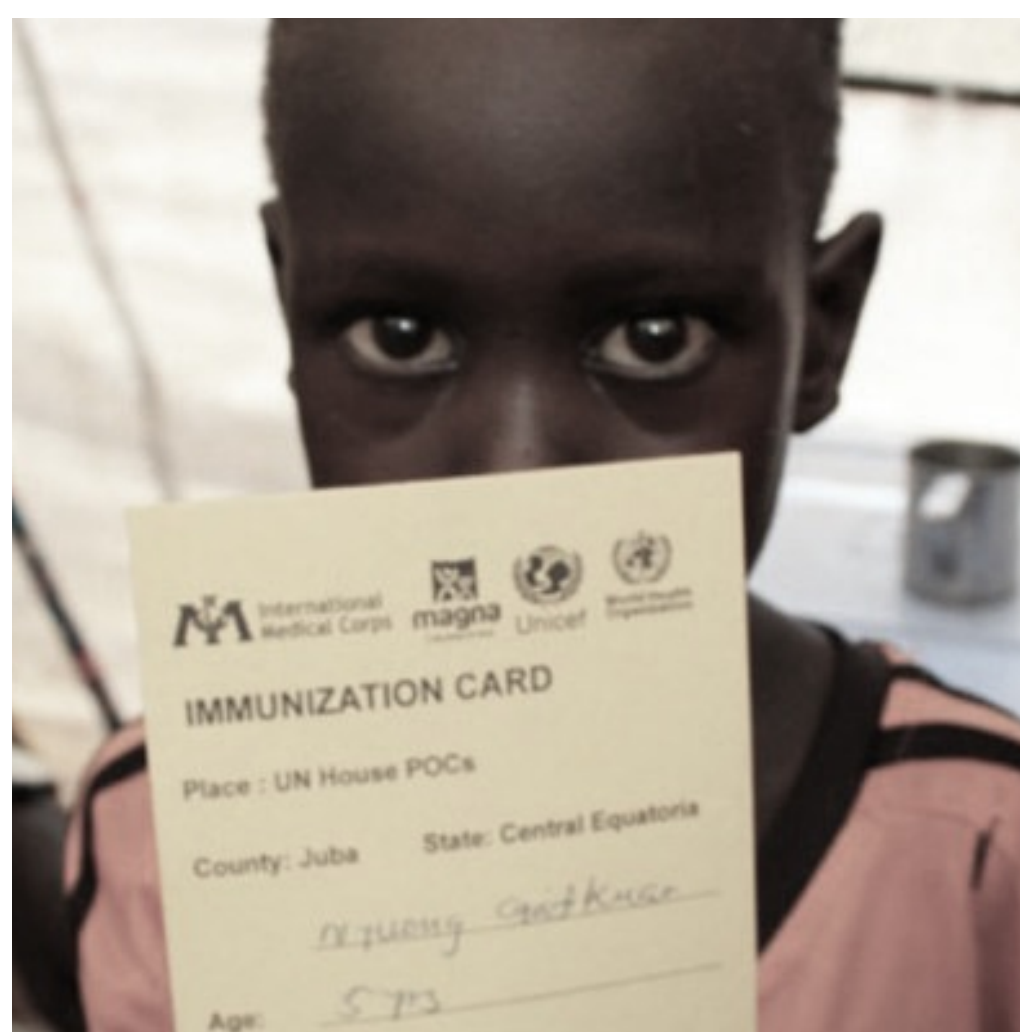
Figure 3. ROC curves for Random Forest Classifier (A) and Gradient Boosting Decision Tree (B).



Our Impact

Our work is helping UNICEF program staff make policies to improve immunization data quality.

Our models will be scaled and adapted for other countries, especially those where immunization gaps are the largest.



Yellow cards like this one help us know which kids have received their vaccines. UNICEF.org, accessed on 11th May 2018, https://www.unicef.org/

Help Us Thank Our Sponsors!



- Erin McAweeney
- Sneha Vasanth
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