This research examines how the characteristics of terrorist attacks predict the chance of an attack succeeding, where an attack is defined as successful if the intended attack type is carried out. Data from The Global Terrorism Database was analyzed across three geographical missions within Operation Enduring Freedom: Trans-Saharan, Horn of Africa, and the Philippines. The three models were able to distinguish between successful and unsuccessful attacks at 78.74%, 82.11%, 74.25%, respectively. Using predicted probabilities of success obtained from stratified logistic regression models, the medians were plotted to compare the characteristics of terrorist attacks across missions. The coefficients for each model were analyzed to compare the odds of success for each variable level to the odds of success of the reference level for that variable. Lastly, the coordinates for successful and unsuccessful attacks as classified by the dataset were plotted to explore spatial patterns in regional maps. Many insights were gathered through analyzing Operation Enduring Freedom missions. By determining the specific characteristics of attacks that produce the highest probabilities of success, the effectiveness of Operation Enduring Freedom can be improved by focusing counter-terrorism training and operations on the features that predict successful attacks.

### INTRODUCTION

Operation Enduring Freedom is a comprehensive response to the spread of terrorism around the world. Beginning in 2002, the United States launched counter-terrorism efforts towards training, equipping, and conducting combat operations in the hopes of strengthening regional security and peace. Regions in which specific counter-terrorism missions have been established are continuing to endure insurgency resistance and violent extremism. Contrary to international terrorism, many countries are currently battling terrorists and militants in open confrontation over sovereign territory and resources. Terrorist groups have assumed governing authority in numerous areas under their control, imposing taxes and restrictions on the general populace. As extremist conflict continues in highly affected regions such as West Africa, East Africa, and Southeast Asia, intelligence-driven counter-terrorism strategies are crucial to increasing mission effectiveness and establishing long-term security.

### METHODS

- **Logistic Regression**: was used to predict whether a terrorist attack was either successful or unsuccessful based on characteristics of each attack.
- **Exponentiated Beta Coefficients**: were calculated to determine how each variable level affected the odds of a terrorist attack succeeding.
- **Stratified Point Plots**: display the median predicted probability of success for each predictor variable level.
- **Ox-Density Spatial Maps**: were used to visualize the geographical distribution of successful and unsuccessful terrorist attacks.

### RESULTS

**Mapping of Successful/Unsuccessful Attacks** Figure 1 shows that terrorist attacks are concentrated in Aqap, Mali, Burkina Faso, Nigeria, Sudan, and Somalia. Figure 2 shows that terrorist attacks have historically occurred throughout all provinces in the Philippines. Failed attempts are most frequent on the southern island of Mindanao. Failed attempts are sporadic within the clusters of successful attacks.

**High Odds Ratios of Successful Attacks** Figure 3 shows the stratified ROC Curves for the three logistic regression models. The chances that each model can distinguish between successful and unsuccessful attacks for each of the three operations are: Trans-Sahara (78.74%), Horn of Africa (82.11%), Philippines (74.25%). Table 1, 2, and 3 show the exponentiated coefficients each result in the odds of each level compared to the reference level. The reference level is given under each group of variable levels.

**Median Predicted Probabilities of Success**

**GROUP** Table 4 shows that attacks carried out by the New People’s Army is predicted to have the lowest probability of success compared to any other terrorist group. Suicide attacks in the Trans-Sahara and Jannahwar in the Horn of Africa, both regional ethnic groups, are predicted to be more successful than jihadist terrorist groups (Nusair al-Islam, Boko Haram, Al-Qaeda, Al-Shabaab).

**TARGET TYPE** Figure 5 shows the predicted probability of success for attack targets. • Attacks targeting diplomatic and government personnel, airports, and maritime facilities have a lower probability of success in the Philippines.

**ATTACK TYPE** Figure 6 shows distributions in the likelihood of an attack resulting in the death of hostages, and the probability of success for the Trans-Sahara and Horn of Africa.

**WEAPON TYPE** Figure 7 shows that the predicted probability of success changes based on the type of weapon. Blackmail, Hijackings, and Armed Assualts have the lowest probability of success compared to the Trans-Sahara and Horn of Africa regions.

**CONCLUSIONS**

Operation Enduring Freedom can increase resources, save lives, and prevent the spread of violent extremism by focusing on those that make a successful attack.

- **Barricade Incidents, Unarmed Assaults, Infrastructure Attacks, and Incendiary weapons** have the highest probability of success. The odds of an attack succeeding when it involves a barricade incident with hostages is 10,491 times greater than the odds of an attack succeeding when it involves a barricade incident.
- **Attacks targeting private citizens, tourists, non-governmental organizations, and food or water supply, have the largest probability of success for the Trans-Sahara and Horn of Africa regions. Suicide attacks in the Philippines raise the chance of success.**