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Introduction

Operation Enduring Freedom is a comprehensive response to the spread of terrorism around the world. Beginning in 2002, the United States spearheaded 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 seized 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.

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 was analyzed across three geographical missions within Operation Enduring Freedom: Trans-Sahara, Horn of Africa, and the Philippines. Using predicted probabilities of success obtained from logistic regression models, the medians were plotted to compare the characteristics of terrorist attacks across missions. By determining the specific features 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.

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.
- **Dot-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 Algeria, 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%).**

MEDIAN PREDICTED PROBABILITIES OF SUCCESS

WEAPON TYPE Figure 4 shows that the predicted probability of success when explosives and firearms are used is lower in the Philippines than the Trans-Sahara and Horn of Africa. Biological and Fake weapons are predicted to result in a failed terrorist attack in the Trans-Sahara.

SUICIDE Figure 5 shows that **suicide attacks increase the probability of success** in the Philippines. However, they decrease the probability of success in the Trans-Sahara. The involvement of suicide in attacks in the Horn of Africa have little effect on the probability of an attack succeeding.

VICINITY Figure 6 shows that an attack will have a similar probability of success, regardless of whether an attack takes place inside the city or on the outskirts of the city in any of the three mission areas.

GROUP Figure 7 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. Fulani extremists in the Trans-Sahara and Janjaweed in the Horn of Africa, **both regional ethnic groups, are predicted to be more successful than jihadist terrorist groups (Nusrat al-Islam, Boko Haram, Al-Qaida, Al-Shabaab).**

TARGET TYPE Figure 8 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.
- Attacks targeting **private citizens, tourists, non-governmental organizations, maritime facilities, and food or water supply**, have the largest probability of success for attacks in the Trans-Sahara and Horn of Africa.

ATTACK TYPE Figure 9 displays similarities in the effect that attack methods have on the probability of success in all three mission areas.

- **Unarmed Assaults, Infrastructure Attacks, Kidnappings, and Barricade Incidents** have probabilities of success greater than 0.95 for each of the three mission areas.
- Bombings, Hijackings, and Armed Assaults in the Philippines have a lower probability of success compared to the Trans-Sahara and Horn of Africa regions.

COUNTRY Figure 10 shows the predicted probability of successful terrorist attacks.

- **Trans-Sahara** Attacks in Mauritania are predicted to have the lowest probability of succeeding while attacks in Morocco and Senegal have the highest probability of succeeding.
- **Horn of Africa** Attacks in Kenya are predicted to have the lowest probability of succeeding while attacks in Djibouti and Eritrea have the highest probability of succeeding.
- **Philippines** Operation Enduring Freedom – Philippines is concentrated in only the Philippines.

