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TESTING THE EFFECTS OF US AIRSTRIKES ON INSURGENT INITIATED ATTACKS IN
YEMEN

by

JOSHUA FAY ALLEN

Under the Direction of Louis Alexandre Berg, P.hD

ABSTRACT

Are U.S. airstrikes on al-Qaeda in the Arabian Peninsula effective at reducing al-Qaeda in the Arabian Peninsula initiated attacks? Airstrikes have been a popular counterterrorism tool in the Obama and Trump administrations. However, the effectiveness of airstrikes has been contentious. Using ACLED data from 2016-2019 I estimate a series of negative binomial regressions. I first assess the effect of airstrikes generally and find that airstrikes are effective at reducing AQAP attacks. I then disaggregate my airstrike variable to examine the effects of militant casualties, leadership casualties, and civilian casualties independently. I find that civilian casualties and leadership casualties have no effect on AQAP attacks while militant casualties have reduced AQAP attacks.

INDEX WORDS: Strategic violence, Civil Wars, Counter-Insurgency, Airstrikes

TESTING THE EFFECTS OF US AIRSTRIKES ON INSURGENT INITIATED VIOLENCE
IN YEMEN

by

JOSHUA FAY ALLEN

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts Political Science

in the College of Arts and Sciences

Georgia State University

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2019

TESTING THE EFFECTS OF US AIRSTRIKES ON INSURGENT INITIATED VIOLENCE
IN YEMEN

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May 2019

DEDICATION

I want to dedicate this project to the memory of Tyler Bunn. Rest in Power.

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First I need to thank Alex Berg, Dan Altman, and John Horgan for turning this project into what it is today. I think it would be apt to apologize/thank each of them for reading each version I sent them. Dr. Berg was one of the first Professors I ever interacted with at Georgia State and is a great mentor. Dr. Berg patiently read through each version of this paper and provided invaluable feedback despite what was very incremental improvements through each version. Dr. Berg has made me a better writer and a better scholar in ways he doesn't fully appreciate. Dr. Altman helped me talk through so many of my ideas when I was as a first-year graduate student until they made sense to me. Dr. Altman has been the other Californian in the department and helped me by giving me ideas for future research, giving professional advice, or helping me find solutions to problems I had with this paper and many others. Dr. Horgan encouraged me and pushed me throughout this entire process to evaluate how rigorous I had been about reading everything that I should have. Just as importantly he made me question whether I had read enough of the literature versus focusing on my methods.

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LIST OF ABBREVIATIONS

Al-Qaeda.....	AQ
Al-Qaeda in the Arabian Peninsula.....	AQAP
Human Intelligence.....	HUMINT
Signals Intelligence.....	SIGINT
Imagery Intelligence.....	IMINT
Counterterrorism.....	CT
Intelligence, Reconnaissance, and Surveillance.....	ISR
Joint Special Operations Command.....	JSOC
Armed Conflict Location and Event Dataset.....	ACLED
Department of Defense.....	D.O.D

1 INTRODUCTION

Officials and pundits have emphasized the effectiveness of employing airstrikes to target leaders and experts in al-Qaeda (henceforth AQ). Supporters of the U.S. drone program have noted that alternative policies for capturing or killing leaders in AQ are inefficient or unrealistic given the constraints of the operational environment.¹ Airstrike advocates argue that airstrikes offer a cost-efficient way to combat terrorism. Al-Qaeda in the Arabian Peninsula (henceforth AQAP) was AQ's most capable affiliate, because of its attacks on the United States and its allies and had one of the most productive propaganda wings in the AQ network.² By some estimates, AQAP has between 4,000 and 5,000 members in Yemen. The number of airstrikes has quadrupled under the Trump administration despite decreases in annual AQAP initiated attacks since 2013.³ The bureaucratic capacity and size of the organization suggest that AQAP should be resilient to being targeted by U.S. airstrikes.⁴ However, we must ask if US airstrikes have been effective at reducing AQAP initiated attacks in Yemen?

Members of the policy community frequently disagree over the effectiveness of airstrikes as a counterterrorism tool (henceforth CT) and little consensus in the academic community about

¹ Daniel L. Byman, "Why Drones Work: The Case for Washington's Weapon of Choice," Brookings Institution, 2013, <https://www.brookings.edu/articles/why-drones-work-the-case-for-washingtons-weapon-of-choice/>. Madiha Afzal, "Drone Strikes and Anti-Americanism in Pakistan," *Brookings Institution*, 2013, <https://www.brookings.edu/opinions/drone-strikes-and-anti-americanism-in-pakistan/>.

² Council on Foreign Relations, "Al-Qaeda in the Arabian Peninsula," 2015, <https://www.cfr.org/backgrounder/al-qaeda-arabian-peninsula-aqap>.

³ Sudarsan Raghavan, "Still Fighting Al-Qaeda," July 6, 2018, https://www.washingtonpost.com/news/world/wp/2018/07/06/feature/as-a-u-s-shadow-war-intensifies-in-yemen-al-qaeda-is-down-but-not-out/?utm_term=.4a0128b27795; National Consortium for the Study of Terrorism and Responses to Terrorism (START), "Global Terrorism Database[Data File]," 2018, <https://www.start.umd.edu/gtd>.

⁴ Jenna Jordan, "When Heads Roll: Assessing the Effectiveness of Leadership Decapitation," *Security Studies* 18, no. 4 (2009): 719–55, <https://doi.org/10.1080/09636410903369068>; Austin Long, "Whack-a-Mole or Coup de Grace? Institutionalization and Leadership Targeting in Iraq and Afghanistan," *Security Studies* 23, no. 3 (July 3, 2014): 471–512, <https://doi.org/10.1080/09636412.2014.935229>.

whether killing non-combatants produces a backlash against the offending actor.⁵ While US airstrikes have killed important leaders in AQAP, they do not resemble the civilian centric approaches advocated by former US officials and the Department of Defense's (henceforth D.O.D) best counter-insurgency practices (henceforth COIN).⁶ However, some previous studies have found that US airstrikes reduce terrorist attacks in the immediate aftermath of an airstrike and over the lifetime of the US air campaign, despite civilian casualties.⁷ Findings from Pakistan suggest that US airstrike are not responsible for massive influxes of recruits from communities affected by airstrikes.⁸

The literature on the effects of violence in civil war has exploded in recent years.⁹ However, there is still a lack of systemic analysis of the effects of airpower on conflict dynamics.¹⁰ The literature provides some insight into the utility of coercive airpower.¹¹ Understanding how airstrikes affect the subsequent behavior of terrorist groups is not only a critical policy concern but contributes to the debate on how the state's strategies affect the insurgent group's behavior. The literature emphasizes the role that information sharing by civilians affects the strategies that

⁵ Audrey Kurth Cronin, "Why Drones Fail When Tactics Drive Strategy," *Foreign Affairs*, 2013, <https://www.foreignaffairs.com/articles/somalia/2013-06-11/why-drones-fail>; Byman, "Why Drones Work: The Case for Washington's Weapon of Choice."

⁶ David J. Kilcullen, *The Accidental Guerilla: Fighting Small Wars in the Midst of a Big One* (Oxford, UK: Oxford University Press, 2009); Army Field Manual and Combined Arms Operations, "Army Field Manual Combined Arms Operations Part 10 Counter Insurgency (Strategic and Operational Guidelines)" 1, no. 1 (2001).

⁷ Patrick B. Johnston and Anoop K. Sarbahi, "The Impact of Us Drone Strikes on Terrorism in Pakistan," *International Studies Quarterly* 60, no. 2 (2016): 203–19, <https://doi.org/10.1093/isq/sqv004>; Asfandyar Mir and Dylan Moore, "Drones , Surveillance , and Violence : Theory and Evidence from a US Drone Program," 2018, https://www.asfandyarmir.com/uploads/9/7/3/0/97303082/cteff_mir_moore.pdf.

⁸ Aqil Shah, "Do U.S. Drone Strikes Cause Blowback?: Evidence from Do U.S. Drone Strikes Cause Blowback?," *International Security* 42, no. 4 (2018): 47–84, https://doi.org/10.1162/isec_a_00312; John Horgan, *The Psychology of Terrorism*, Revised an (New York City, New York: Routledge, 2014).

⁹ Stathis N Kalyvas, "Micro-Level Studies of Violence in Civil War: Refining and Extending the Control-Collaboration Model," *Terrorism and Political Violence* 24, no. 4 (September 1, 2012): 658–68, <https://doi.org/10.1080/09546553.2012.701986>.

¹⁰ Johnston and Sarbahi, "The Impact of Us Drone Strikes on Terrorism in Pakistan."

¹¹ Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996); Dan Horowitz, Michael C., Reiter, "When Does Aerial Bombing Work" 45, no. 2 (2001): 147–73, <https://doi.org/https://doi-org.ezproxy.gsu.edu/10.1177/0022002701045002001>.

incumbents and the insurgents use. While tips from civilians are an important source of information, the US can substitute human intelligence (henceforth HUMINT) for signals intelligence (henceforth SIGINT) or imagery intelligence (henceforth IMINT) to build a profile of a target.¹² I will discuss this more in the sections below. US counter-terrorism policy (henceforth CT) has, amongst other goals, tried to degrade AQ and its affiliates by targeting its leadership and members with technical expertise.¹³

In this paper, I test the effects of airstrike on AQAP violence and then I test whether civilians killed by US airstrikes affect the number of AQAP attacks.¹⁴ In line with Mir, I argue that the U.S. technological and bureaucratic sophistication allows the U.S. to gather a variety of information to overcome the identification problem and target members of AQAP. The ability to quickly exploit intelligence disrupts plots in the planning stage, force adjustments to logistics, and compromises the AQAP's ability to train and recruit. Despite U.S. intelligence capabilities civilian casualties do occur.¹⁵ In instances where the U.S. fails to overcome the identification problem, and a civilian casualty occurs, I argue that civilian casualties do not have an effect on AQAP violence. Because airstrikes target members of AQAP civilians understand what behavior will be punished with violence. The community can then make the decision to punish the group or other members of the community for compromising their physical safety.¹⁶

¹² Sometimes referred to as Baseball Cards by Joint Special Operations Command (henceforth JSOC)

¹³ Trump Administration, "National Strategy for Counterterrorism of the United States of America," 2018, <https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-protecting-america-terrorism/>; Obama Administration, "National Strategy For Counterterrorism," 2011, https://obamawhitehouse.archives.gov/sites/default/files/counterterrorism_strategy.pdf.

¹⁴ The long-term effectiveness of US airstrikes reducing AQAP terrorist attacks is outside the scope of this study.

¹⁵ Jack Serle and Jessica Purkiss, "Drone Wars: The Full Data," The Bureau of Investigative Journalism, 2017, <https://www.thebureauinvestigates.com/stories/2017-01-01/drone-wars-the-full-data>.

¹⁶ Asfandiyar Mir, "What Explains Counterterrorism Effectiveness? Evidence from the U.S. Drone War in Pakistan," *International Security* 43, no. 2 (November 1, 2018): 45–83, https://doi.org/10.1162/isec_a_00331.

Using ACLED data from 2016-2019 I estimate a series of negative binomial regressions to test the effects of US airstrikes on AQAP violence. I first assess the effect of airstrikes generally and find that airstrikes are effective at reducing AQAP attacks. I then disaggregate my airstrike variable to test the independent effects of militant casualties, leadership casualties, and civilian casualties on AQAP violence. By disaggregating my airstrike variable, I can assess the effects overcoming the identification problem and not overcoming the identification. I find that AQAP attacks are not affected by civilian casualties while militant casualties have reduced AQAP attacks.

This thesis proceeds as follows. The next section gives a concise history of AQAP. The next section reviews how the US uses different types of information to build its list of targets and determine locations of those individuals. Drawing from the literature of civilian agency in conflict, the identification problem, and strategic violence. I discuss the local incentives present when actors use violence against the community. In the third section, I will lay my empirical strategy and dataset, and I will discuss my results and present the interpretations of my findings. I conclude with the implications of my findings and future areas of research.

2 BACKGROUND

In this section, I will start by introducing the history of AQAP and the US's efforts to counter AQAP. I will also outline how the US government conceptualizes its application of information and technology in its drone program and practical constraints to the ideal use of a drone.

2.1 History of AQAP

AQAP has been an essential part of the AQ network for the last decade. AQAP has provided consultation to other AQ affiliates, held territory in Yemen, and been responsible for

several high-profile international terrorist attacks.¹⁷ The history of the AQAP's dates to the 1980s when part-time preachers and Saleh's government pushed young men to travel to Afghanistan to fight the Soviet Union. Yemeni veterans of the Afghan war against the Soviet Union played a minor role in the 1994 Yemeni civil war. Saleh had approved of the support of jihadists to help him defeat the force of Southern Yemen.

AQAP, as we know it today, starts with a merger between AQ members who had escaped from Saudi Arabia's defeat of AQ in Saudi Arabia, and after 23 members of AQ escaped from prison in Sanaa. In 2009, the US State Department officially designated AQAP as a Foreign Terrorist Organization. This designation came a week before Umar Farouk Abdulmutallab's bomb failed to detonate on Northwest Airlines Flight 253 from Amsterdam to Detroit. Abdulmutallab dropped out of his graduate program in August of 2009 and met with Anwar Awlaki, a senior AQAP cleric, to start his training in AQAP. In December of 2009, the group constructed the explosive device that he would sneak onto Flight 253. The attempted bombing was not the first time that AQAP had inspired or organized an attack on U.S. soil. In November 2009, Nidal Hasan killed thirteen people and injured thirty-two people at Fort Hood. In the subsequent investigation, Hasan's links to Awlaki were discovered. Awlaki admitted to communicating with Hasan and praised his actions in later statements he made.¹⁸

With the growing instability of Yemen during the Arab Spring from 2011 to 2012, AQAP increased its effort to attack the U.S. and gain territory in the provinces of Abyan and Shabwa. In 2014, Houthi forces expel the Hadi government from Sanaa which would mark the start of the civil

¹⁷ Katherine Zimmerman, "The Al Qaeda Network: A New Framework For Defining the Enemy" (Washington, DC, 2013), <https://www.criticalthreats.org/analysis/the-al-qaeda-network-a-new-framework-for-defining-the-enemy>. Katherine L Zimmerman, "AQAP's Role in the Al Qaeda Network" (American Enterprise Institute, 2013), https://www.criticalthreats.org/wp-content/uploads/2016/07/pdf_uploadanalysisZimmerman_AQAPs_Role_in_the_al_Qaeda_Network_September_2013-1.pdf.

¹⁸ Gregory D. Johnsen, "The Two Faces of Al-Qaeda in The Arabian Peninsula," War on the Rocks, 2018.

war. AQAP capitalizes on the deteriorating security situation by taking al-Mukallah, the fifth largest city in Yemen, and other southern cities in 2015. During this time AQAP also claims credit for the attack on the Charlie Hebdo headquarters in Paris.

Airstrikes have been a critical part of the U.S.'s kinetic strategy since 2006 and the drone program has been one of the fastest growing contingents of the United States Air Force.¹⁹ The U.S.'s first airstrike in Yemen occurs in 2002 when the US kills, Abu al-Harithi, one of the orchestrators of the USS Cole attack in 2000.²⁰ The U.S. used what it dubbed as the "Partner model" where US air support and intelligence were employed alongside Yemeni military forces. In the program's infancy when an airstrike killed Jabir al-Shabwani, the governor of Marib and a political rival of Saleh, caused some in the Obama administration to reassess the dynamics of the partnership. The US had few sources of information independent of the Saleh government. This forced some in the Obama administration to look towards deepening its partnership with other regional actors.²¹

As Yemen deteriorated into civil war, the U.S. relied on Saudi Arabia as its counter-terrorism partner in Yemen. Saudi Arabia has made inroads into penetrating AQAP which has given American intelligence a source of HUMINT within the group.²² Since 2003, Saudi Arabia has been an important CT partner in some respects. The Saudis have provided valuable information about AQAP plots, they play an important role in the U.S.'s efforts to shut off funding to AQAP,

¹⁹ Oriana Pawlyk, "Drone Milestone: More RPA Jobs than Any Other Pilot Postion," *Military*, 2017, <https://www.military.com/daily-news/2017/03/08/drone-milestone-more-rpa-jobs-any-other-pilot-position.html>.

²⁰ Leila Hudson and Colin S. David J. Callen Owens, "Drone Warfare in Yemen: Fostering Emirates through Counterterrorism? | Middle East Policy Council," *Middle East Policy Council*, accessed November 14, 2018, <https://www.mepc.org/drone-warfare-yemen-fostering-emirates-through-counterterrorism>.

²¹ Gregory D. Johnsen, *The Last Refuge: Yemen, Al-Qaeda, and America's War in Arabia* (New York City, New York: W. W. Norton, 2013).

²² Yoram Schweitzer, Tal First, and Einav Yogev, "Anti-Terror Alliance: Saudi Arabia, Yemen, and the United States vs. Al-Qaeda and Its Affiliates," *The Institute for National Security Studies*, 2012.

and Saudi Arabia home to an important drone base.²³ Amongst some analysts argue that AQAP is capable of international terrorist attacks but is focused on its domestic stakes.²⁴ AQAP had always tried to appeal to the tribes by reinforcing popular rumors or suspicions of the tribes about how Saleh had co-opted tribal leadership.²⁵ Since the onset of the civil war, there has been a noticeable turn in the orientation of AQAP propaganda against Houthi forces.²⁶ This is also noticeable in the group's demographics with a shift from foreign recruits to Yemeni recruits.²⁷ Some experts argue that while the size of the group has increased since 2015, U.S. airstrikes have contributed to its decline in terrorist attacks on foreign targets. There is evidence to suggest that airstrikes have contributed to eliminating capable leaders, like its founder and leader Nasir al-Wuhayshi, and refinement of how/when airstrikes are used.²⁸ These improvements may, in part, be the reason for the decline in AQAP violence despite the growing size of AQAP.

2.2 The US Drone Program

The initial stage of US drone operations starts with finding the target. Finding and identifying comes from a start point that arises from a variety of intelligence sources.²³ When a target is established the operation enters the “Fix” phase of the operation where the target is

²³ Daniel L. Byman, “The U.S.-Saudi Arabia Counterterrorism Relationship,” Brookings Institution, 2016, <https://www.brookings.edu/testimonies/the-u-s-saudi-arabia-counterterrorism-relationship/>.

²⁴ Zimmerman, “AQAP’s Role in the Al Qaeda Network.”

²⁵ Sarah Phillips, “Al-Qaeda and the Struggle for Yemen,” *Survival* 53, no. 1 (February 1, 2011): 95–120, <https://doi.org/10.1080/00396338.2011.555605>.

²⁶ Ahmed Himmiche et al., “Letter Dated 26 January 2018 from the Panel of Experts on Yemen Mandated by Security Council Resolution 2342 (2017) Addressed to the President of the Security Council (S/2018/68)” (New York City, New York, 2018), <https://doi.org/10.1017/S0020818300001107>; Elisabeth Kendall, “Al-Qaeda & Islamic State in Yemen: A Battle for Local Audiences,” 2014, https://www.academia.edu/15757466/Al-Qaida_and_Islamic_State_in_Yemen_A_Battle_for_Local_Audiences.

²⁷ Some argue that the increase in recruits is due to IDP’s from Houthi controlled territory moving to the southern Yemen creating a minor influx in recruitment. Ben Watson, “The War in Yemen and the Making of a Chaos State,” *Defense One*, n.d., <https://www.defenseone.com/feature/yemen-making-chaos-state/>.

²⁸ Himmiche et al., “Letter Dated 26 January 2018 from the Panel of Experts on Yemen Mandated by Security Council Resolution 2342 (2017) Addressed to the President of the Security Council (S/2018/68)”; Watson, “The War in Yemen and the Making of a Chaos State”; Johnsen, “The Two Faces of Al-Qaeda in The Arabian Peninsula.”

tracked to a precise location. The US drone program combines a variety of intelligence, surveillance, and reconnaissance capabilities (henceforth ISR) to track and collect data on a target. Data collection happens over a sustained period to reach the near certainty standard before entering the “Finish” phase of the operation. The “Finish” phase of the cycle is where the target is captured or killed. The amount of data that has been gathered also allows analysts to analyze existing data or process new data to restart the targeting process. The ability to quickly exploit existing data prevents the IC from having to completely restart intelligence gathering.²⁹

Drones serve a multipurpose role for the US counter-terrorism mission: they play a crucial part in collecting SIGINT, IMINT, and as a weapons delivery platform.³⁰ SIGINT has played a critical part of the targeting program for several years. By JSOC estimates most operations rely on SIGINT to complete the “Fix” phase of the targeting process.³¹ Information gathered via airborne ISR are a crucial part of the US’s ongoing operations for many reasons: 1) Airborne ISR expands the US’s intelligence into remote areas or areas where human informants do not feel safe passing information and 2) airborne ISR can corroborate tips that are provided by human intelligence.³² Drones can hover over targets for longer and at a much lower cost than a manned aircraft with a similar sensor array and weapons payload making them an ideal tool for CT operations.³³ When drones are used for ISR operations they can act based on information collected in real time if they are armed.²⁸ Mir argues that quality information is necessary, but not

²⁹ Michael Flynn, Rich Juergens, and Thomas L. Cantrell, “Employing ISR SOF Best Practices,” *National Defense University Press*, 2008, <http://www.dtic.mil/docs/citations/ADA516799>.

³⁰ Mir and Moore, “Drones , Surveillance , and Violence : Theory and Evidence from a US Drone Program.”

³¹ The Intercept, “Small Footprint Operations 2/13,” The Intercept, 2015, <https://theintercept.com/document/2015/10/15/small-footprint-operations-2-13/#page-4>.

³² Erik Lin-Greenberg, “Airpower in Peace Operations Re-Examined,” *International Peacekeeping* 18, no. 4 (August 1, 2011): 439–53, <https://doi.org/10.1080/13533312.2011.588390>.

³³ William M. Arkin, *Unmanned: Drones, Data, and The Illusion of Perfect Warfare* (New York City, New York: Little, Brown and Company, 2015).

sufficient for explaining the effectiveness of counter-terrorism.³⁴ The amount and the variety of information that the US has on a population under surveillance help planners distinguish who is a member of AQAP and who is a civilian.³⁵

Mir argues that speed of exploiting that information determines the effectiveness of a counter-insurgent action. Effectiveness in this framework has both an immediate and long-term that reduces counter-insurgent activity. The immediate effect of airstrikes is that insurgents lose resources or lose members of the group. Airstrikes have a long-term effect based on the organizations perceived or actual loss of anonymity. Insurgent groups adjust their areas of operation limiting their reach. The loss of anonymity also forces members of the group to lose trust in other members of the group. When insurgents lose their anonymity, it also affects their ties with populations living in areas they control and how they interact with other insurgent groups.³⁶

3 LITERATURE REVIEW

In this section, I will discuss the relevant literature and their implications for this study. Subnational studies have shown local conditions affect the state's and insurgent's decision to use violence. I will start by discussing the identification problem and how it constrains U.S. choices. I then discuss how overcoming the identification effects the behavior of insurgents and civilians. I will then discuss the theoretical implications of targeting civilians. I will then lay out my thesis and testable hypothesis.

3.1 The Identification Problem

In this section, I will discuss the role of violence in civil war and how it affects insurgent group behavior. The inability to separate who is a friend or a foe amongst the population is

³⁴ Mir, "What Explains Counterterrorism Effectiveness? Evidence from the U.S. Drone War in Pakistan."

³⁵ Ibid

³⁶ Ibid

a common feature in many civil wars. Accounts from civil wars in different countries and at different times relay accounts of foot soldiers who were afraid of not being able to identify the enemy amongst the population. Mao Tse Tung likened civilian populations to an ocean that insurgents hide in.³⁷

The inability to distinguish between a combatant and a non-combatant and has become known as the identification problem. Counter-insurgents want to overcome the identification problem for several reasons.³⁸ Hiding amongst the population helps insurgent groups reduce both the numerical and technological advantage of the counter-insurgent forces. The ability to evade capture and avoid open field battles increases the likelihood that insurgents will win.³¹ Overcoming the identification problem imposes an additional cost on counter-insurgents that stretch a finite amount of resources.

The U.S. has also drawn on its experience in prior conflicts that have informed its view of the benefits of overcoming the identification problem over its costs. Overcoming the identification problem is seen as normatively important to the D.O.D, but it is also important for effective COIN. U.S. officials argue that minimizing civilian casualties reduces grievances against US forces making it difficult for insurgents to recruit.³⁹ The US, until recent Trump administration changes, required a “near certainty” principle for approval. The “the near certainty” principle required that an individual killed in the airstrike was the intended target, and “near certainty” that no non-combatants would be injured or killed in the airstrike. These regulations fall in line with the rules

³⁷ Benjamin Valentino, Paul Huth, and Dylan Balch-lindsay, “ ‘ Draining the Sea ’: Mass Killing and Guerrilla Warfare,” *International Organization* 58, no. 2 (2004): 375–407.

³⁸ Counter-insurgent forces in this instance should be thought of as the security forces of a recognized government.

³⁹ Matthew Kocher, Thomas B Pepinsky, and Stathis N Kalyvas, “Aerial Bombing and Counterinsurgency in the Vietnam War” 00, no. 0 (2011): 1–18, <https://doi.org/10.1111/j.1540-5907.2010.00498.x>; Kilcullen, *The Accidental Guerilla: Fighting Small Wars in the Midst of a Big One*; Michael Hastings, “The Runaway General: The Profile That Brought Down McChrystal” (New York City, New York, July 2010).

of engagement that D.O.D set out for the use of force.⁴⁰ The rules of engagement dictate how military force is used and written to comply with best practices and the law of armed conflict.⁴¹ These constraints limit the type of strategic violence that the U.S. can use against insurgent groups and produce requirements to overcome the identification problem.⁴² As the previous section outlined, the U.S. has invested a lot of resources into developing resources that circumvent the need for human sources. US intelligence can rely on the spread of smartphones, high-resolution images, and allied intelligence to overcome gaps from a lack of sustained presence on the ground. The surveillance capability that the U.S. relies on is also supported by an extensive infrastructure to analyze this data. This allows for the U.S. to determine with a higher level of certainty that who they are targeting is a member of AQAP and not a civilian.

3.2 Strategic Violence

In this section, I outline how overcoming the identification problem effects the strategies of both militants and civilians. The ability to overcome the identification problem dictates the type of violence counter-terror forces use. The literature distinguishes violence by who the violence targets and the specificity of the information that is used to identify the target.⁴³ When a counter-

⁴⁰ For issues with the near certainty principal see: Lynn E. Davis, McNerney Michael, and Michael Greenberg, “Clarifying the Rules for Targeted Killing: An Analytical Framework for Policies Involving Long-Range Armed Drones” (Washington,DC, 2016), https://www.rand.org/content/dam/rand/pubs/research_reports/RR1600/RR1610/RAND_RR1610.pdf. Daniel J. Rosenthal and Loren Dejonge Schulman, “Trump’s Secret War on Terror,” *The Atlantic*, August 10, 2018, <https://www.rollingstone.com/politics/politics-news/the-runaway-general-the-profile-that-brought-down-mcchrystal-192609/>; Department of Justice, “Procedures for Approving Direct Action Against Terrorist Targets,” 2013, https://www.justice.gov/oip/foia-library/procedures_for_approving_direct_action_against_terrorist_targets.

⁴¹ Department of Defense Law of War Program, “LAW OF WAR/ INTRODUCTION TO RULES OF ENGAGEMENT: B130936,” n.d., [https://www.trngcmd.marines.mil/Portals/207/Docs/TBS/B130936 Law of War and Rules Of Engagement.pdf](https://www.trngcmd.marines.mil/Portals/207/Docs/TBS/B130936%20Law%20of%20War%20and%20Rules%20of%20Engagement.pdf).

⁴² Stathis N Kalyvas, *The Logic of Violence in Civil War* (New York City, New York: Cambridge University Press, 2006), <https://doi.org/978-0-521-67004-3>.

⁴³ Kalyvas; Laia Balcells, “Continuation of Politics by Two Means: Direct and Indirect Violence in Civil War,” *Journal of Conflict Resolution* 55, no. 3 (2011): 397–422, <https://doi.org/10.1177/0022002711400865>; Laia Balcells, *Rivalry and Revenge: The Politics of Violence during Civil War* (Cambridge University Press, 2017); Reed M. Wood, “From Loss to Looting? Battlefield Costs and Rebel Incentives for Violence,” *International Organization*

insurgent targets an individual within the community with violence, it is based on something that the individual has done or is in the process of doing to support an insurgent group. Counter-insurgents target this individual based off a piece of information that implicates that individual for supporting insurgent groups.⁴⁴ Punishing a non-combatant for a behavior enforces what actions are taboo or illegal. There is a clear expectation that if the community follows a set of rules or does not join a certain group then the community will not be punished.⁴⁵

Actors gain reputations for the kinds of violence they employ which dictates how the community acts. Indiscriminately targeting a community incurs damage to an actor's reputation-making punishment by the community more likely.⁴⁶ Shah suggests that this dynamic is present in the Federally Administered Tribal Areas of Pakistan (henceforth FATA). The community felt a sense of alienation by the Pakistani government and the Taliban because Pakistani counter-insurgency operations punished them for perceived affiliation and the Taliban imposed mandatory taxes. Whereas members of the community felt that the Americans had targeted individuals for their affiliation with AQ or the Taliban.⁴⁷ Evidence from Vietnam suggests that the Vietcong would intentionally provoke attacks by American GIs against villages to force the community to support. The type of violence the community is subjected to dictates the actions available to the community to ensure their own security and the available sanctions to apply.⁴⁸ In the case of Yemen, there is

68, no. 4 (2014): 979–99, <https://doi.org/10.1017/S0020818314000204>; Abbey Steele, *Democracy and Displacement in Colombia's Civil War* (Ithaca, NY: Cornell University Press, 2017).

⁴⁴ Steele, *Democracy and Displacement in Colombia's Civil War*; Alexander B. Downes, *Targeting Civilians in War* (Ithaca, NY: Cornell University Press, 2008); Balcells, "Continuation of Politics by Two Means: Direct and Indirect Violence in Civil War"; Balcells, *Rivalry and Revenge: The Politics of Violence during Civil War*.

⁴⁵ There is evidence from different civil wars to suggest that denunciations are sometimes used for personal gain or for revenge. For Further discussion of malicious denunciation see Kalyvas, *The Logic of Violence in Civil War*.

⁴⁶ Jeremy M Weinstein, *Inside Rebellion: The Politics of Insurgent Violence* (New York City, New York: Cambridge University Press, 2006).

⁴⁷ Shah, "Do U.S. Drone Strikes Cause Blowback?: Evidence from Do U.S. Drone Strikes Cause Blowback?"

⁴⁸ Stathis N Kalyvas and Matthew Adam Kocher, "How 'Free' Is Free Riding in Civil Wars? Violence, Insurgency, and the Collective Action Problem," *World Politics* 59, no. 2 (2007): 177–216.

no official US troop presence. This limits the ability of civilians to directly sanction US forces for airstrikes that kill members of the community.⁴⁹ This may force the community to sanction an actor they have at best ambivalent feelings towards.⁵⁰

The type of violence that is used against insurgents also changes the environment they operate in and the decisions available to them.⁵¹ If counter-insurgents can leverage information to target insurgents hiding amongst the population it is likely to increase the counter-insurgents likelihood of winning the war. Insurgent groups are forced to adapt their security practices to try to counteract this and to regain an advantage in the conflict.³⁹ While the group's communications and operations may become more opaque, the additional layers of security might reduce the efficiency of the group's day-to-day operations. The length of time it takes for leaders and subordinates to communicate with each other is crucial. In hierarchical institutions like a militant group, there are often multiple layers of approval that are required to conduct and plan operations. Decisions by the group to decrease the efficiency of the decision-making process reduces the number of operations a group is likely to conduct.⁵²

H₁: All else equal, U.S. airstrikes decrease AQAP-initiated attacks

H₂: All else equal, U.S. airstrikes that kill AQAP leaders decrease AQAP initiated attacks.

⁴⁹ Leo Shane III and Joe Gould, "Should US Troops Be Involved in the Yemen Civil War?," *Military Times*, February 13, 2019, <https://www.militarytimes.com/news/pentagon-congress/2019/02/13/should-us-forces-be-involved-in-the-yemen-civil-war/>.

⁵⁰ Nadwa Al-dawsari, "Our Common Enemy: Ambiguous Ties Between Al-Qaeda and Yemen's Tribes," *Carnegie Endowment For International Peace*, January 2018, <https://carnegie-mec.org/2018/01/11/our-common-enemy-ambiguous-ties-between-al-qaeda-and-yemen-s-tribes-pub-75225>.

⁵¹ Paul Staniland, *Networks of Rebellion: Explaining Cohesion and Collapse* (Ithaca, NY: Cornell University Press, 2014).

⁵² For more on the security versus efficiency trade off see Jacob N. Shapiro, *The Terrorist's Dilemma: Managing Violent Covert Organizations* (Princeton, NJ: Princeton University Press 322, 2013).

Using more accurate information also gives counter-insurgent forces the ability to target the group's operations and supply lines. Overcoming the identification allows the US to degrade the group by inflicting losses to AQAP's resource endowment and labor force. Being able to target leadership figures also deprives the group of capable leaders. Leadership deaths have been shown to affect the long-term survival of terrorist groups. The death of important leaders also changes how the group communicates with each other. To account for the possibility that leadership deaths are more important than the death of a soldier, therefore driving the results, I test the effects of leadership deaths independently.⁵³

Airstrikes limit the amount of area that insurgents can openly control and operate. Targeting the group's operations have been shown to change how armed actors use violence.⁵⁴ Insurgent groups rely on a mixture of local support, captured resources, and in some cases external support. The inability to move weapons and food would reduce the number of insurgent-initiated attacks. While gaining these resources are important for insurgents transporting them from one place to the other is as important of a task. Insurgent supply lines are not divorced from the existing infrastructure of the country in which they operate. Primary source documents from AQ in Africa reveal frustrations from senior leadership over the inability to move resources due to issues with the existing infrastructure and due to security concerns. Subnational research using spatial statistics has found that these realities hold in other conflicts.⁵⁵ Moving supplies also give

⁵³ Patrick B Johnston, "Does Decapitation Work? Assessing the Effectiveness of Leadership Targeting in Counterinsurgency Campaigns," *International Security* 36, no. 4 (April 1, 2012): 47–79, https://doi.org/10.1162/ISEC_a_00076.

⁵⁴ Yuri M Zhukov, "External Resources and Indiscriminate Violence: Evidence from German-Occupied Belarus," *World Politics* 69, no. 1 (2017): 54–97, <https://doi.org/DOI:10.1017/S0043887116000137>.

⁵⁵ Yuri M Zhukov, "An Epidemic Model of Violence and Public Support in Civil War," 2013, <https://doi.org/10.1177/0738894212456936>; John O'Loughlin, Edward C Holland, and Frank D W Witmer, "The Changing Geography of Violence in Russia's North Caucasus, 1999-2011: Regional Trends and Local Dynamics in Dagestan, Ingushetia, and Kabardino-Balkaria," *Eurasian Geography and Economics* 52, no. 5 (September 1, 2011): 596–630, <https://doi.org/10.2747/1539-7216.52.5.596>; Clint Watts, Jacob N. Shapiro, and Brown Vahid, "Al-

US planners a useful tool for minimizing civilian casualties. US planners have used the transportation of resources or personnel as an opportunity to eliminate targets with a lower risk of civilian casualties. Targeting the movement of goods and personnel weakens AQAP by depleting it of resources and human capital. The changing resource endowment of AQAP may force them to change how often they train, attack, or resupply. These adaptations are going to decrease attacks AQAP can conduct. AQAP could increase their attacks after the loss of leaders or militants. AQAP may want to satisfy a desire to get revenge or to send a credible signal that the group is still viable.⁵⁶ However, I argue that this is unlikely because the losses to AQAP's labor force and resource endowment is too great making subsequent attacks unlikely.

3.3 The Effects of Civilian Casualties in Civil Conflict

In this section, I discuss how civilian reaction to violence affects the behavior of armed actors in civil wars. The reaction of civilians to violence affects the behaviors of both incumbents and insurgent actors. There are two different viewpoints about how violence against civilians shapes the behavior of both insurgents and incumbents. Both views in the literature are grounded in the collective action problem and how private costs affect the community's decision to punish or reward incumbents and insurgents.

One school argues that violence against civilians induces more violence against the side that killed civilians. The violence inducing school argues that violence used against non-combatants should lead to retaliation because civilians are either willing to provide information or

Qaida's (Mis)Adventures in the Horn of Africa" (West Point, NY, 2007), <https://ctc.usma.edu/al-qaidas-misadventures-in-the-horn-of-africa/>.

⁵⁶ Roger Petersen, *Understanding Ethnic Violence: Fear, Hatred, and Resentment in Twentieth Century Eastern Europe* (New York City, New York: Cambridge University Press, 2002); Mia M. Bloom, "Palestinian Suicide Bombing: Public Support, Market Share, and Outbidding," *Political Science Quarterly* 119, no. 1 (2004): 61–88, <https://doi.org/10.2307/20202305>; Megan Smith and James Igoe Walsh, "Do Drone Strikes Degrade Al Qaeda? Evidence From Propaganda Output," *Terrorism and Political Violence* 25, no. 2 (April 1, 2013): 311–27, <https://doi.org/10.1080/09546553.2012.664011>.

withhold information about the actions of the other side. The violence inducing school's conception of the collective action problem argues that the cost of nonalignment should force non-combatants to pick a side. The logic is that civilians realize the cost of not being protected by either side in contested areas risks their lives. However, their preferences may be informed by pre-war political behavior and punishment in the war may be because of these pre-war political alignments.⁵⁷ In the violence-inducing school civilians withhold information or provide information to sanction the actor responsible for killing members of the community. For example, if incumbent forces kill civilians the violence-inducing school argues that civilians withhold information from the incumbents. The lack of information makes it easier for insurgents to plan and execute attacks.

Defection in civil wars are often modeled as fluid and switching sides does not have any consequences for the defector. These processes may be to some degree dynamic, but Schutte argues that civilians wait to provide information to ensure the personal safety of themselves, their family, etc.⁵⁸ Defection is costly for individuals switching to the incumbent side. In most cases, individuals are unsure if whether they will be prosecuted for participating in the insurgency. In some cases, defection to one side is permanent. In Somalia, defectors are required to identify members of al-Shabaab, in front of the community, without any attempt to conceal the identity of

⁵⁷ David Galula, *Counterinsurgency Warfare: Theory and Practices*, ed. New Edition (Santa Barbara, California: Praeger Security International, 1964); Kalyvas, *The Logic of Violence in Civil War*; Kalyvas and Kocher, "How 'Free' Is Free Riding in Civil Wars? Violence, Insurgency, and the Collective Action Problem"; Luke N. Condra and Jacob N. Shapiro, "Who Takes the Blame? The Strategic Effects of Collateral Damage," *American Journal of Political Science* 56, no. 1 (2012): 167–87, <https://doi.org/10.1111/j.1540-5907.2011.00542.x>; Paul Gill, James A. Piazza, and John Horgan, "Counterterrorism Killings and Provisional IRA Bombings, 1970–1998," *Terrorism and Political Violence* 28, no. 3 (2016): 473–96, <https://doi.org/10.1080/09546553.2016.1155932>; Balcells, *Rivalry and Revenge: The Politics of Violence during Civil War*; Efraim Benmelech et al., "Counter-Suicide-Terrorism: Evidence from House Demolitions," *The Journal of Politics* 77, no. 1 (2012): 27–43, <https://doi.org/10.2139/ssrn.2163578>; Yuri Zhukov, "A Theory of Indiscriminate Violence" (Department of Government, 2014), <https://sites.lsa.umich.edu/zhukov/publications/>.

⁵⁸ Sebastian Schutte, "Violence and Civilian Loyalties : Evidence from Afghanistan," *Journal of Conflict Resolution* 61, no. 8 (2017): 1595–1625, <https://doi.org/10.1177/0022002715626249>.

the defector. Al-Shabaab has also adopted a zero-tolerance policy for defectors, and the group executes those individuals that defect.⁵⁹

The suppressive violence school argues, that under certain conditions when violence against the community reaches a certain level, the community will opt to fence sit rather than taking a side. The suppressive violence school argues that killing civilians can restore the private cost of supporting a rebellion. Violence reintroduces the risks of participation making a classic collective action problem. Scholars from this school also argue that killing civilians can drive a wedge between the population and the group, or violence disrupts supply lines forcing inefficient adaptations reducing violence.⁶⁰ Zhukov argues that civilians are likely to bandwagon against a more selective opponent if one side is willing and able to punish the collective to render activities that balance against the indiscriminate side as costlier than compliance with the indiscriminate side. In Zhukov's model, the incumbents or insurgents can substitute information with violence to achieve their goals. In this case, if the incumbents lack a relationship with the community they can increase the amount of violence on the town controlled by the insurgents to a level where it is too costly for the town to support the insurgents.⁶¹

Let me clarify that the authors that make these arguments and myself do not condone the deliberate targeting of civilians in wartime. However, understanding that in some instances the death of civilians can also reduce violence is essential. Advocates and policymakers have argued for decades that the policies that kill civilians are inefficient. However, policies ranging from the

⁵⁹ John Horgan, "When Terrorists Defect," *CNN*, May 3, 2018, <https://www.cnn.com/2018/05/03/opinions/somalia-lost-boys-opinion-horgan/index.html>.

⁶⁰ Alexander B. Downes, "Draining the Sea by Filling the Graves: Investigating the Effectiveness of Indiscriminate Violence as a Counterinsurgency Strategy," *Civil Wars* 9, no. 4 (2007): 420–44, <https://doi.org/10.1080/13698240701699631>; Downes, *Targeting Civilians in War*; Jason Lyall, "Does Indiscriminate Violence Incite Insurgent Attacks?: Evidence from Chechnya," *Journal of Conflict Resolution* 53, no. 3 (2009): 331–62; Yuri M Zhukov, "A Theory of Indiscriminate Violence" (Harvard, 2014), https://sites.lsa.umich.edu/zhukov/wp-content/uploads/sites/140/2015/11/Zhukov_Thesis_compressed.pdf.

⁶¹ Zhukov, "A Theory of Indiscriminate Violence," 2014.

deliberate bombing of cities, forced displacement, concentration camps, or extensive indiscriminate airstrikes remain a commonplace contemporarily and historically.

Civilian reaction to violence is critical because it drives the type of cooperation or resistance they choose to employ. Classic and contemporary works emphasize the importance of winning the “hearts and minds” of civilians and their impact on the success of an insurgency or counterinsurgency. In cases where violence is not contingent on civilian information the cost of either moving to a different location or taking a side in the conflict may be too high for the community. Civilians preference may be to remain neutral, if possible, ensuring that no side gains benefits from their cooperation in hopes that the violence will stop or not affect their community.⁶² If violence is targeted at a community because of ethnic and religious identification, tribal affiliations, or political preferences then sustained violence against this community may force the population to move. The migration of a friendly population deprives an insurgency of its base of support.⁶³ Where counter-insurgent forces completely rely on civilian information to identify insurgents withholding information has major implications for counterinsurgent forces.⁶⁴ If civilians can punish or reward one side with their sanctions, it is essential to consider that civilians killed by counter-insurgent actions explain why insurgent-initiated attacks increase.

⁶² Ana Arjona, “Subnational Units, the Locus of Choice and Theory Building: The Case of Civilian Agency in Civil War,” in *Subnational Research in Comparative Politics*, ed. Eudardo Moncada and Richard Snyder (Cambridge University Press, n.d.), 1–32, <http://www.anamarjona.net/research.html>.

⁶³ Kilcullen, *The Accidental Guerilla: Fighting Small Wars in the Midst of a Big One*; Jason Lyall and Isaiah Wilson, “Rage Against the Machines: Explaining Outcomes in Counterinsurgency Wars,” *International Organization* 63, no. 1 (2009): 67–106, <https://doi.org/DOI: 10.1017/S0020818309090031>; Christopher Paul et al., “Paths to Victory: Lessons from Modern Insurgencies,” *RAND Corporation*, 2013, <https://doi.org/10.1214/07-EJS057>; Abbey Steele, “Civilian Resettlement Patterns in Civil War,” *Journal of Peace Research* 56, no. 1 (2019): 28–41, <https://doi.org/10.1177/0022343318820576>.

⁶⁴ Andrew C. Shaver and Jacob N. Shapiro, “The Effect of Civilian Casualties on Wartime Informing : Evidence from the Iraq War,” 2016, https://scholar.princeton.edu/sites/default/files/jns/files/hicn_workingpaper210_shavershapiro.pdf.

H₃: All else equal, US airstrikes that kill civilians have no effect on AQAP-initiated attack

I do not expect civilian casualties will increase AQAP-initiated attacks. The community cares about maximizing their security and adopt policies to sanction the relevant actor.⁶⁵ Because the airstrikes punish individuals for their membership in/support of AQAP the community understands what behavior or which individuals will attract airstrikes. The community can then take steps to punish other members of the community who risk the safety of the community and know what behavior will be punished by US airstrikes.⁶⁶ There is anecdotal evidence to suggest that tribes have threatened to withdraw tribal protection from individuals and entire clans who have affiliated themselves with AQAP. Tribes have even formed multi-lateral agreements to sanction AQAP.⁶⁷ Tribes can do this because in many cases they are not reliant on AQAP for protection and have a relative power advantage against AQAP giving them the ability to resist coercive violence from AQAP.⁶⁸ As discussed in this section it may be possible that civilian casualties increase AQAP attacks. It is possible that civilians could increase their support for AQAP by joining their group or providing more resources or to punish civilian populations under their control.⁶⁹

⁶⁵ Juan Fernando Tellez, “Worlds Apart: Conflict Exposure and Preferences for Peace,” *Journal of Conflict Resolution* XX, no. X (2018): 1–24, <https://doi.org/10.1177/0022002718775825>.

⁶⁶ Nadwa Al-dawsari, “Foe Not Friend: Yemeni Tribes and Al-Qaeda in the Arabian Peninsula,” 2018, https://pomed.org/wp-content/uploads/2018/02/Dawsari_FINAL_180201.pdf.

⁶⁷ Ibid

⁶⁸ Elisabeth Kendall, “What’s next for Jihadists in Yemen?,” *The Washington Post*, February 23, 2018, https://www.washingtonpost.com/news/monkey-cage/wp/2018/02/23/whats-next-for-jihadists-in-yemen/?utm_term=.69540cd5bda6; Barry R Posen, “The Security Dilemma and Ethnic Conflict,” *Survival* 35, no. 1 (March 1, 1993): 27–47, <https://doi.org/10.1080/00396339308442672>.

⁶⁹ Johnston and Sarbahi, “The Impact of Us Drone Strikes on Terrorism in Pakistan.”

4 EMPIRICAL STRATEGY

In this section, I will outline my empirical strategy to test my hypothesis. First, I will identify the scope of this study. Then I will describe my estimation strategies and variables of interest, I will present the result of my estimations. I will then conclude the section by discussing the results of my models.

4.1 Scope Conditions

In this section, I will lay out the scope of this study. I limit the scope of this study to insurgent-initiated attacks in Yemen. While macrolevel processes can drive events at the local level testing these hypotheses at a subnational level is the most appropriate empirical strategy. Previous studies have found that studying violence at the national level miss local variation. Substantial evidence from other conflicts shows that local conflicts often drive violence in civil war and make testing my hypothesis at the subnational level the most appropriate approach.⁷⁰ While the international attacks have garnered AQAP a significant amount of media and policy attention the group's focus has shifted towards domestic operations. I argue that understanding how US airstrikes effect AQAP behavior at the subnational level is far more relevant at present than how airstrikes affect its international behavior.⁷¹ I limit the scope of the study to areas with an AQAP presence. I omitted areas with no AQAP attacks in the study timeframe. These areas were concentrated mainly in the Houthi controlled areas in the North of Yemen.

⁷⁰ Stathis N Kalyvas, "The Ontology of 'Political Violence': Action and Identity in Civil Wars," *Perspectives on Politics* 1, no. 3 (2003): 475–94, <https://doi.org/DOI: 10.1017/S1537592703000355>.

⁷¹ Himmiche et al., "Letter Dated 26 January 2018 from the Panel of Experts on Yemen Mandated by Security Council Resolution 2342 (2017) Addressed to the President of the Security Council (S/2018/68)."

4.2 Data and Methods

The data comes from the Armed Conflict Event Dataset (ACLED). The dataset runs from 2016-2019 and assumes a panel structure. ACLED data includes event-level data on a variety of events including direct attacks on civilians, airstrikes, and this is done by an actor rather than by dyad. Events are georeferenced and collected daily to enable analysis at a subnational level. The data is collected and coded from secondary sources that include local and regional press stories, and the New America Foundations drone strike database.⁷² ACLED also provides relevant notes on each event allowing me to construct my variables of interest. I aggregated this data to the district-month for this study. US Central Command and JSOC often fail to report the location of an airstrike to the town level. Often the smallest spatial unit that the U.S. government and news sources report on is the district where the airstrike occurred.⁷³

The dependent variable is a count variable that measures casualties, injuries, and property destruction from an AQAP initiated attack.⁷⁴ My dependent variable was constructed by looking at the source notes for each incident for indications of injuries or property damage. Casualty figures were provided by the ACLED dataset. An attack is considered initiated if the source notes indicated that AQAP attacked a target first. Incidents, where security forces, tribes, or Houthi forces were killed after attacking AQAP first, were not considered AQAP initiated attacks and were coded as zero. By including injuries and property damage I can account for the full range of AQAP activity. By only including activity that results in a casualty I would ignore a large amount of AQAP behavior.

⁷² Clionadh Raleigh et al., “Introducing ACLED: An Armed Conflict Location and Event Dataset,” *Journal of Peace Research* 47, no. 5 (2010): 651–60, <https://doi.org/10.1177/0022343310378914>.

⁷³ To ensure that there all US airstrikes are captured I cross check my data against the New America Foundation’s data on US airstrikes. Peter Bergen et al., “America’s Counterterrorism Wars: Dronestrikes Yemen,” New America, n.d., <https://www.newamerica.org/in-depth/americas-counterterrorism-wars/pakistan/>.

⁷⁴ J. Scott Long, *Regression Models for Categorical and Limited Dependent Variables*, 1st ed. (London, UK: SAGE Publications Inc, 1997).

Because my dependent variable is a count of casualties, I will estimate a negative binomial regression. The negative binomial regression allows me to estimate a model where the conditional variance is greater than the conditional mean. With an overdispersion of the conditional variance, it could lead to inefficiency and bias my standard error downwards resulting in larger z-scores.⁷⁵ Where this dependent variable may suffer is that it treats all insurgent operations the same. Operations that utilize multiple tactics in unison to achieve a victory is treated the same as an operation with less sophistication. To control for district heterogeneity, I employed district effects to adjust for time-invariant factors like terrain, oil fields, arable land, and elevation.⁷⁶

I first estimate a model that looks at the effects of US airstrikes. The variable *airstrike* was measured by looking at the number of casualties in each US airstrike. Airstrike is defined as a US airstrike that targets AQAP from a UAV or piloted aircraft with a non-recoverable projectile. The variable was coded by looking at source notes in ACLED. With this variable, I am looking at the effects of US airstrikes regardless of combatant or non-combatant status. I then disaggregated my *airstrike* into three mutually exclusive variables to test the effects of militant casualties, leadership casualties, and non-combatant casualties separately. The variable *militant* is measured as a count of non-leadership militant casualties. The variable was coded by examining source notes in ACLED. Incidents, where there is no explicit mention of an individual's leadership role within the group, were considered militant casualties.⁷⁷ It is possible that leadership death has an outsized effect on the group's operations possible driving the results of my models.⁷⁸ I operationalize a

⁷⁵Ibid

⁷⁶ Cheng Hsiao, *Analysis of Panel Data, Econometric Society Monographs*, Third (Cambridge: Cambridge University Press, 2014), <https://doi.org/DOI: 10.1017/CBO9780511754203>.

⁷⁷ There are a few instances where ACLED identifies that US warships targeted AQAP. These events were treated as airstrikes and were coded the same as other observations in the airstrike variable.

⁷⁸ Bryan C Price, *Targeting Top Terrorists: Understanding Leadership Removal in Counterterrorism Strategy* (New York City, New York: Columbia University Press, 2019); Jenna Jordan, "Attacking the Leader, Missing the Mark: Why Terrorist Groups Survive Decapitation Strikes," *International Security* 38, no. 4 (April 1, 2014): 7–38, https://doi.org/10.1162/ISEC_a_00157.

variable called *HVT* that is measured as a count of AQAP leaders that were killed in a U.S. airstrike. I coded this variable by looking at the source notes from ACLED. If an individual was identified as a leader within AQAP, they were coded as an *HVT*. To test the effects of civilian casualties I operationalize a variable called civilians, which is measured as a count of the number of civilians killed or injured in a US airstrike. The variable was coded by looking at the source notes in ACLED and checking them against other sources. If there was explicit mention that an airstrike resulted in the death of civilians the variable is coded accordingly i.e. 2 children were killed by a U.S. airstrike. Cases where it the affiliation of the person was unknown were not included in this coding.⁷⁹ To adjust for the possibility that an AQAP attack in February is correlated with an airstrike in January I lagged the airstrike variable, the militant casualty variable, the *HVT* casualty variable, and the civilian casualty variable by one month.

4.3 Results

Table 4.1: Descriptive Statistics

Variable Name	Observations	Mean	Minimum	Maximum
Airstrike	13,852	0.09	0	56
Militant	13,852	0.08	0	56
Civilian	13,852	0.01	0	25
HVT	13,852	0.005	0	2

⁷⁹ To ensure I had a representative sample of the airstrikes that are known to have killed civilians I cross referenced each airstrike against New America Foundation Data for the relevant years. For the remainder of 2017-2019 I used the Bureau of Investigative Journalism's data. Serle and Purkiss, "Drone Wars: The Full Data."

Table 4.2: Effects of US airstrikes on AQAP initiated attacks

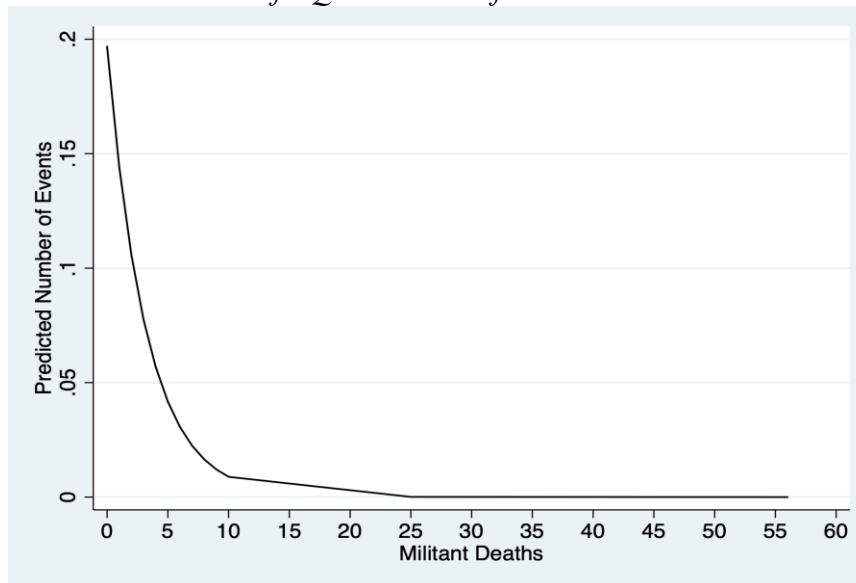
Variables	M1	M2	M3	M4	M5
Airstrike	-0.25* (0.05)				
Militant		-0.51* (0.11)			-0.50* (0.11)
Civilian			-0.15 (0.12)		-0.12 (0.12)
HVT				-0.71 (0.41)	-0.43 (0.42)
District Fixed Effects	X	X	X	X	X
N	13,852	13,852	13,852	13,852	13,852

Note: X denotes district fixed effects were included in the model *p<.05. The standard errors are in parenthesis.

The results of the negative binomial regression are presented in Table 2. As I argued airstrikes decrease the predicted count of AQAP initiated attacks. Model one presents the results of the effect of airstrikes in general. Airstrikes are effective at reducing AQAP attacks as previously theorized. In the models where I disaggregated the airstrike variable are presented in models 2-4. We find a statistically significant relationship of airstrikes that kill militants in the negative direction across each of the general models. The marginal effects of killing a militant in AQAP is presented in figure 1. In the second model, the average effect of an airstrike that kills a militant is a reduction of in the predicted count of attacks to less than one. The loss of 5 AQAP militants in a US airstrike leads to a sizeable reduction in AQAP attacks. Instances, where 20 or more militants were killed by US airstrikes, leads to a predicted count AQAP activity to 0. Airstrikes that have this high of a casualty count are relatively rare in the data. Often losses on this scale are indicative of an airstrike targeting an AQAP training camp. This falls in line with theoretical expectations of the effect of resources. Loss of a substantial portion of an incoming group of recruits and existing members will directly affect AQAP's willingness to operate in the open and has major implications

for their labor force. The age and size of AQAP suggest that its operations would be more resilient to airstrikes. This suggests that the effects that airstrike have on the organization are much higher than previously anticipated.⁸⁰

Figure 4.1: Predicted Number of AQAP attacks after a U.S. airstrike kills a militant



Note: Marginal effects obtained by holding all other covariates at their means. Figure obtained using a pooled model

Interestingly the civilian casualty variable produces statistically insignificant results. This suggests that while normatively objectionable there is little evidence to suggest that the US is punished by the community for killing civilians. I argued that because airstrikes punish members of the community for their affiliation with AQAP. It appears that there is some evidence to support this claim. In models 2 and 4 civilian casualties have no effect on the AQAP initiated attacks while airstrikes that kill militants reduce the predicted count of AQAP initiated attacks. The substantive results of airstrikes in model 3 suggest that airstrikes reduce AQAP initiated attacks despite civilian casualties. The effect of killing leadership figures in model 4 is not statistically significant at

⁸⁰ Jordan, "Attacking the Leader, Missing the Mark: Why Terrorist Groups Survive Decapitation Strikes."

conventional levels of reporting and when all 3 variables are included in the same model only the militant casualty variable remains statistically significant. These results suggest that the effects of reducing AQAP's labor force are much more important than airstrikes that kill leaders. While politically popular leadership casualties may only give politicians an easy political win rather than having any substantive effect on AQAP attacks.⁸¹

Results of my estimations remain consistent when models were estimated with pooled models using clustered standard errors to account for district-level heteroskedasticity. As an additional robustness check of my results using ACLED data, I estimate a series of negative binomial regressions that include a variable that is a count of raids that kill or capture members of AQAP. Raids could be a better explanation for why we see a reduction in AQAP initiated attacks. Raids not only kill insurgents, but they can produce useful information by detainees or through primary source documents. Cronin notes that one of the major windfalls of the raid that captured Abimael Guzmán was the member roster Guzmán kept in his safehouse. The member roster aided in the Peruvian government's efforts to capture members of the Sendero Luminoso (Shining Path). The information that raids collect could feed into the next raid or airstrike.⁸² Raids were not found to be statistically significant in each of the models that I estimated, suggesting that raids do not have an effect on AQAP attacks.⁸³

The results of my estimations suggest that U.S. airstrikes explain the reduction in AQAP attacks in Yemen. In most of the models that I estimate airstrikes that result in the death of a

⁸¹ Asaf Zussman and Noam Zussman, "Assassinations : Evaluating the Effectiveness of an Israeli," *Journal of Economic Perspectives* 20, no. 2 (2006): 193–206, http://isites.harvard.edu/fs/docs/icb.topic700750.files/Zussman_Assassinations_JEP_20_2_2006.pdf; Jordan, "When Heads Roll: Assessing the Effectiveness of Leadership Decapitation."

⁸² Audrey Kurth Cronin, *How Terrorism Ends: Understanding the Decline and Demise of Terrorist Campaigns* (Princeton, NJ: Princeton University Press, 2011).

⁸³ Results of this estimation will be provided upon request. Conquests, such as the take over of Mukalla, were coded as raids. This variable was operationalized by counting the number of militants killed or captured in the raid.

member of AQAP results in a reduction of AQAP initiated attacks. These results suggest a confirmation of the theoretical framework I laid out. There is both substantive and statistical significance to suggest that U.S. airstrikes are effective at reducing AQAP initiated attacks. There may be concerns that these are targets of opportunity that are determined by prior knowledge of where AQAP operates. While best practices are not followed to the letter by U.S. combat and command this possibility seems unlikely. There are a much larger set of incentives to gather more information on the population in question than there is to hit targets of opportunity. In most instances, if there is sole reliance on airborne ISR it could take multiple days to gather the necessary information. Best practices dictate that three independent flights over a target or an area of surveillance are the best course of action. JSOC argues that this is not only to fix the location of the target and the target's identity but to establish patterns of interaction. This builds a much bigger deck of baseball cards to continue these operations.⁸⁴

It is possible that as U.S. airstrikes continue to target leadership in AQAP the group becomes less discriminate in their own behavior. Leaders play an important role in the decisions group make and the policies they pursue.⁸⁵ This loss of discrimination may make civilians intolerant to AQAP behavior. However, while I do not model the target selection of AQAP it does suggest that if I am correct civilians punish the indiscriminate actor through either information sharing or barring AQAP members from their communities. These results are at least preliminary and the nature of the civilian agency in Yemen and how social cohesion within AQAP is affected by U.S. airstrikes should continue to be explored. I argued that the individualized nature of the violence not only degrades the group but sets expectations and allows the community to employ

⁸⁴ Flynn, Juergens, and Cantrell, "Employing ISR SOF Best Practices."

⁸⁵ Kathleen Gallagher Cunningham and Katherine Sawyer, "Conflict Negotiations and Rebel Leader Selection," *Journal of Peace Research*, April 15, 2019, 0022343319829689, <https://doi.org/10.1177/0022343319829689>.

sanctions. Yemen is different from Pakistan, Iraq, and Afghanistan because there is not a major U.S. troop presence. Airstrikes, where there is a feasible way for civilians to sanction the actor that conducted them, may produce different results.⁸⁶ The impact of civilian casualties leads to a significant decrease in the number of tips U.S. forces received from the civilian population in Iraq and Afghanistan.⁸⁷ The results of this study suggest that there is evidence to support the violence suppressive school. In Yemen, the only actor the community can sanction for civilian casualties is AQAP. This results in the community adopting policy preferences and strategies that maximizes their personal security. In most areas, the cost of not having tribal protections is costlier than the benefits of AQAP affiliation. These communities can afford to stay neutral and can punish those who endanger the physical security of the group.⁸⁸

Subsequent research should use qualitative interviews or experiments to understand how US airstrikes effect perceptions of both militants and the communities affected by US airstrikes.⁸⁹ It is also possible that airstrikes change how recruits see the utility of joining an insurgent organization or how the organization recruits. Influxes of new recruits may seem like too big of a risk considering continued airstrikes. Costly signals of recruits' commitment or qualifications may

⁸⁶ Jason Lyall, "Bombing to Lose? Airpower, Civilian Casualties, and the Dynamics of Violence in Counterinsurgency Wars," Unpublished, 2015, <https://doi.org/10.2139/ssrn.2422170>.

⁸⁷ Luke N Condra et al., "The Effect of Civilian Casualties in Afghanistan and Iraq" (Cambridge MA, 2010); Schutte, "Violence and Civilian Loyalties : Evidence from Afghanistan."

⁸⁸ Nadwa Al-dawsari, "Tribal Governance and Stability in Yemen," 2012, <https://carnegieendowment.org/2012/04/24/tribal-governance-and-stability-in-yemen-pub-47838>; Al-dawsari, "Foe Not Friend: Yemeni Tribes and Al-Qaeda in the Arabian Peninsula"; Arjona, "Subnational Units, the Locus of Choice and Theory Building: The Case of Civilian Agency in Civil War"; Ana Arjona, "Institutions, Civilian Resistance, and Wartime Social Order: A Process-Driven Natural Experiment in the Colombian Civil War," *Latin American Politics and Society* 58, no. 3 (2016): 99–122, <https://doi.org/DOI: 10.1111/j.1548-2456.2016.00320.x>.

⁸⁹ Jason Lyall, Graeme Blair, and Kosuke Imai, "Explaining Support for Combatants during Wartime: A Survey Experiment in Afghanistan," *American Political Science Review* 107, no. 4 (2013): 679–705, <https://doi.org/10.1017/S0003055413000403>.

be shifted by the changing context of the conflict.⁹⁰ However, how counterinsurgent actions impact the supply side of the labor market for insurgent groups is outside the focus of this study.

5 CONCLUSION

AQAP attacks have been in decline for several years. I argued that the decline in attacks should be explained by U.S. airstrikes. Based on the result of my models US airstrikes explain the reduction in the number of AQAP attacks. I want to express caution about the findings of this study. I do not model the effect of the broader conflict. My models only capture the interaction between the U.S. and AQAP and largely ignores other actors in the conflict. I do not consider that multiple actors could have an effect on reducing violence. Yemen is one of the most complex ongoing conflicts with multiple militias, tribes, and international actors interacting in both violent and non-violent interactions. Subsequent studies could make use of network statistics to understand how multi-party conflicts impact individual actors and embrace the complexity of the conflict. This study suggests that considering the effects of multiple actors have on conflict is important, and not equally weighted.⁹¹ Airstrikes may be more likely to change the type of attack that AQAP is willing to conduct. Future research should look at whether airstrikes make groups willing to target non-combatants or insurgents.⁹²

Notably this study also only considers the effects of airstrikes on civilian agency. It is just as likely that AQAP attacks make civilians willing to inform counter-insurgent forces. Victimization based on reputation, severity, or risk that the community sees more violence could make non-combatants more likely to provide information to counter-insurgent forces. More

⁹⁰ Thomas Hegghammer, “The Recruiter’s Dilemma: Signalling and Rebel Recruitment Tactics,” *Journal of Peace Research* 50, no. 1 (January 1, 2013): 3–16, <https://doi.org/10.1177/0022343312452287>.

⁹¹ Cassy Dorff, Max Gallop, and Shahryar Minhas, “Networks of Violence: Predicting Conflict in Nigeria,” *Journal of Politics*, no. Forthcoming (2018), <https://github.com/s7minhas/conflictEvolution>.

⁹² Max Abrahms and Philip B K Potter, “Explaining Terrorism: Leadership Deficits and Militant Group Tactics,” *International Organization* 69, no. 2 (2015): 311–42, <https://doi.org/DOI: 10.1017/S0020818314000411>.

insurgent attacks in a district which could incentivize the U.S. to conduct more airstrikes. Leveraging parallel trends or instrumental variables to address concerns of endogeneity will give us a better insight into the effects of COIN campaigns.

Studies that rely on casualty figures suffer from some well-known issues. One of the primary issues of using the number of casualties in an airstrike is there is very little transparency by the US government about how many civilians are killed. There is a variety of reasons why this figure remains unknown to the public, and the best efforts to date have been inconclusive. The U.S. government's coding criteria for a militant is based on age, gender, and proximity to a targeted individual if their affiliation is unknown. The U.S. government has publicly released data on civilian casualties, but the consensus from the NGO and scholarly community is that the figures undercount the number of civilians that are killed. Even more troubling is the recent decision by the Trump administration to stop releasing data on civilian casualties. Former American officials have accused foreign governments of inflating the number of civilian casualties, and local journalists have noted that insurgent groups will restrict access to sites in the immediate aftermath.⁹³

Additionally, this study largely ignores the role of tribal institutions and their role in Yemeni and the role of tactics by actors on the ground. The structure of the community determines the cost of gaining access to the community. Evidence from Honduras and Columbia suggests that some communities are more susceptible to criminal and rebel violence than others.⁹⁴ Tribes play a pivotal role in Yemeni society.⁹⁵ Some evidence suggests that tribes and AQAP have a complex

⁹³ Byman, "Why Drones Work: The Case for Washington's Weapon of Choice."

⁹⁴ Louis Alexandre Berg and Marlon Carranza, "Organized Criminal Violence and Territorial Control: Evidence from Northern Honduras," *Journal of Peace Research* 55, no. 5 (2018): 566–81, <https://doi.org/10.1177/0022343317752796>; Ana Arjona, *Rebelocracy: Social Order in the Colombian Civil War* (Cambridge, UK: Cambridge University Press, 2016).

⁹⁵ Daniel Corstange, "Tribes and the Rule of Law in Yemen," *Annual Conference of the Middle East Studies Association* 91, no. 3 (2008): 481–510.

relationship with each other. After the al-Mukalla raid, tribal leadership threatened to withdraw tribal protections from clans or individuals who were caught aiding AQAP. There are also instances where tribes have leveraged AQAP's abilities to conduct suicide terrorism missions and construct complex IEDs.⁹⁶ This suggests that in some instances tribes are willing to balance against more powerful actors in the conflict by allying themselves with groups like AQAP. Understanding the complex natures of alliances in civil wars is important to understand why some communities make the decision to resist or cooperate with armed actors.⁹⁷

Tribes also played a pivotal role in mediating between actors. There are several instances where mediated settlements lead to a withdrawal of AQAP.⁹⁸ Subsequent research should investigate how interpersonal ties within the community effects insurgent and counter-insurgents' decision to use violence. It is important for the academic and policy community to consider that the decline in insurgent-initiated attacks could be tied to how communities decide to cooperate or resist armed actors.⁹⁹ Understanding why communities decide to participate in conflict remains elusive. Moving toward a complete understanding of why communities decide to participate in conflict will give us a better understanding of not only how to prevent violence, but how post-conflict resolution agreements should look like.

One broader implication of this study is how we think about how technology changes the way we conduct warfare. Airstrikes are less likely to get national attention than the loss of an American soldier. Technology changes the way civilians can share information, how people perceive the

⁹⁶ Al-dawsari, "Foe Not Friend: Yemeni Tribes and Al-Qaeda in the Arabian Peninsula"; Al-dawsari, "Our Common Enemy: Ambiguous Ties Between Al-Qaeda and Yemen's Tribes."

⁹⁷ Fotini Christia, *Alliance Formation in Civil Wars* (Cambridge: Cambridge University Press, 2012), <https://doi.org/DOI: 10.1017/CBO9781139149426>.

⁹⁸ Raleigh et al., "Introducing ACLED: An Armed Conflict Location and Event Dataset."

⁹⁹ Ana Arjona, "Civilian Cooperation and Non-Cooperation with Non-State Armed Groups: The Centrality of Obedience and Resistance," *Small Wars and Insurgencies* 28, no. 4–5 (2017): 755–78, <https://doi.org/10.1080/09592318.2017.1322328>.

collective action problem, and the way armed actors can overcome the identification problem. Focusing solely on civilian information is problematic because we miss a multibillion-dollar infrastructure that can be just as effective at overcoming the identification problem. This study suggests that U.S. airstrikes are effective at reducing the AQAP attacks. This study is amongst a growing body of literature that suggests this tactic has both short- and long-term effects on insurgent violence. These results suggest that the effects of airstrikes are not just limited to Pakistan and that U.S. airstrikes are effective at reducing insurgent-initiated attacks in different contexts. While there are numerous legal and ethical issues that have been raised about the use of airstrikes. If airstrikes continue to be successful at reducing terrorist attacks, it is unlikely that the U.S. or any other state will discontinue this policy.

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