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Shutting It Down: Investigating the Implementation of Internet Shutdowns

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A Research Report submitted in partial fulfillment of the requirements for the degree of Master of Arts in the field of e-Science

in the

School of Social Sciences
University of the Witwatersrand, Johannesburg

1 October 2024

Declaration

I, Nerissa Muthayan (1618342), declare that this report is my own, unaided work. It is being submitted for the degree of Master of Arts in the field of e-Science at the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at any other university.



Nerissa Muthayan (1618342)

1 October 2024

"3 continents, 5 countries and 13 cities.
It's been a long time coming."

Acknowledgements

Firstly, I would like to extend my gratitude and appreciation to my supervisors, “if I have seen further it is by standing on the shoulders of giants”.

Thank you Michael for your guidance, support and patience. Your encouragement has been invaluable and I am incredibly grateful for the opportunity to have had you as my supervisor.

Thank you Rod for inspiring not only the topic of this study but also for inspiring me to pursue this degree in the first place.

I would also like to thank the DSI-NICIS National e-Science Postgraduate Teaching and Training Platform (NEPTTP) for funding my studies. Opinions expressed and conclusions arrived at, are my own and are not necessarily to be attributed to the NEPTTP.

I want to extend my heartfelt appreciation to my family and friends, who have supported me throughout my studies despite never fully understanding what it is that I am actually studying.

Lastly, I would like to thank myself.
May this serve as a reminder that I can indeed do hard things.

NERISSA MUTHAYAN (1618342)

Shutting It Down: Investigating the Implementation of Internet Shutdowns

Abstract

The principles of democracy are crumbling under the rise of digital authoritarianism, as the internet is becoming more censored. Internet shutdowns during elections and protests threaten democratic principles, human rights, and effective governance.

This study examines the political and socioeconomic factors that influence a government's decision to implement an internet shutdown, using multivariate logistic regression models to analyse the relationship between regime type, economic development, internet penetration, and other key variables.

Findings indicate that lower levels of democracy and economic development significantly increase the likelihood of shutdowns, as governments seek to control political discourse and suppress dissent. Internet penetration is a strong predictor of shutdowns during protests, while its influence on shutdowns during elections is less pronounced. These findings contribute to the growing body of research on digital authoritarianism, highlighting the role of internet shutdowns as a mechanism of political control.

This study underscores the importance of safeguarding digital rights, strengthening democratic institutions, and promoting economic development to mitigate the risks of internet shutdowns.

Contents

Declaration i

Acknowledgements iii

List of Figures vii

List of Tables viii

1 Introduction 1

1.1 Introduction 1
1.2 Purpose of the Study 3
1.3 Significance of the Study 3
1.4 Research Question 4
1.5 Research Objectives 5
1.6 Limitations 5
1.7 Ethical Considerations 6
1.8 Report Structure 6

2 Theoretical Background 8

2.1 Introduction 8
2.2 Technology and Democratisation 8
2.3 The Rise of Digital Authoritarianism 9
2.4 The Phenomenon of Internet Shutdowns 11
2.4.1 Internet shutdowns in relation to technological capacity 12
2.4.2 Internet shutdowns during elections and protests 14
2.4.3 The economic impact of internet shutdowns 16
2.5 Conclusion 16

3 Research Methodology 18
3.1 Introduction ... 18
3.2 Research Design ... 18
3.2.1 Overview of Research Design ... 18
3.2.2 Multivariate Logistic Regression Model ... 19
Multivariate Regression ... 19
Logistic Regression ... 19
Multivariate Logistic Regression ... 20
3.2.3 Programming Software ... 20
3.2.4 Units of Analysis ... 21
3.3 Investigation Sample ... 21
3.4 Dependent Variable: Internet Shutdowns ... 22
3.4.1 General Overview ... 22
3.4.2 Internet Shutdowns ... 23
3.4.3 Internet Shutdowns and Elections ... 24
Elections ... 24
Internet shutdowns during elections ... 25
3.4.4 Internet Shutdowns and Protests ... 25
Protests ... 25
Internet shutdowns during protests ... 26
3.5 Independent Variables: Democracy and Development Indicators ... 26
3.5.1 General Overview ... 26
3.5.2 Degree of Democracy (Regime Type): ... 27
3.5.3 Income Group (GDP per capita): ... 29
3.5.4 Education: ... 30
3.5.5 Internet Penetration: ... 32
3.6 Control Variables ... 33
3.6.1 General Overview ... 33
3.6.2 Control Variable 1 - Population: ... 33
3.6.3 Control Variable 2 - Unemployment: ... 35
3.7 Data Methods ... 36
3.8 Summary of Variables and Data Sources ... 38
3.9 Conclusion ... 38

4 Results and Analysis **39**
4.1 Introduction 39
4.2 Univariate Analysis 39
4.2.1 Summary Statistics 39
4.2.2 Data Transformations 41
4.3 Bivariate Analysis 43
4.3.1 Correlation Matrix 43
4.3.2 Formulation of Dependent Variable 46
Internet shutdowns during elections 46
Internet shutdowns during protests 47
Regression Model of Internet Shutdowns 48
4.4 Main Results 50
4.4.1 General Overview 50
4.4.2 Regression Model 1: Internet Shutdowns during Elections 50
4.4.3 Regression Model 2: Internet Shutdowns during Protests 53
4.4.4 Robustness Check Regression Models 57
4.4.5 Alternative Regression Model 1: Internet Shutdowns during Elections 57
4.4.6 Alternative Regression Model 2: Internet Shutdowns during Protests 59
4.5 Conclusion 60

5 Discussion and Implications **61**
5.1 Introduction 61
5.2 Summary of Research Findings 61
5.3 Implications for Existing Body of Literature 64
5.4 Implications for Policymakers 65
5.5 Conclusion 66

6 Conclusion **67**
6.1 Conclusion 67
6.2 Suggestions for Future Studies 69

Bibliography **71**

List of Figures

1.1 Annual Global Internet Shutdowns 2

3.1 Causal Diagram of Democracy and Internet Shutdowns 27
3.2 Causal Diagram of Income Group and Internet Shutdowns 29
3.3 Causal Diagram of Education and Internet Shutdowns 31
3.4 Causal Diagram of Internet Penetration and Internet Shutdowns 32
3.5 Causal Diagram with Population as a Control 34
3.6 Causal Diagram with Unemployment as a Control 35

4.1 Histogram of Income Group (log) 41
4.2 Histogram of Population (log) 42
4.3 Correlation Matrix Heatmap 44

List of Tables

3.1 Summary of V-dem Polyarchy Indices 28
3.2 Summary of Variables and Data Sources 38

4.1 Summary Statistics of Independent Variables 40
4.2 Updated Summary Statistics of Standardised Variables 43
4.3 Contingency Table on Internet Shutdowns and Elections 46
4.4 Contingency Table on Internet Shutdowns and Protests 47
4.5 Effects Decomposition Table - Shutdowns 48
4.6 Effects Decomposition Table - Shutdowns during elections 52
4.7 Effects Decomposition Table - Shutdowns during protests 54
4.8 Robustness Effects Decomposition Table - Shutdowns during elections 58
4.9 Robustness Effects Decomposition Table - Shutdowns during protests 59

Chapter 1

Introduction

1.1 Introduction

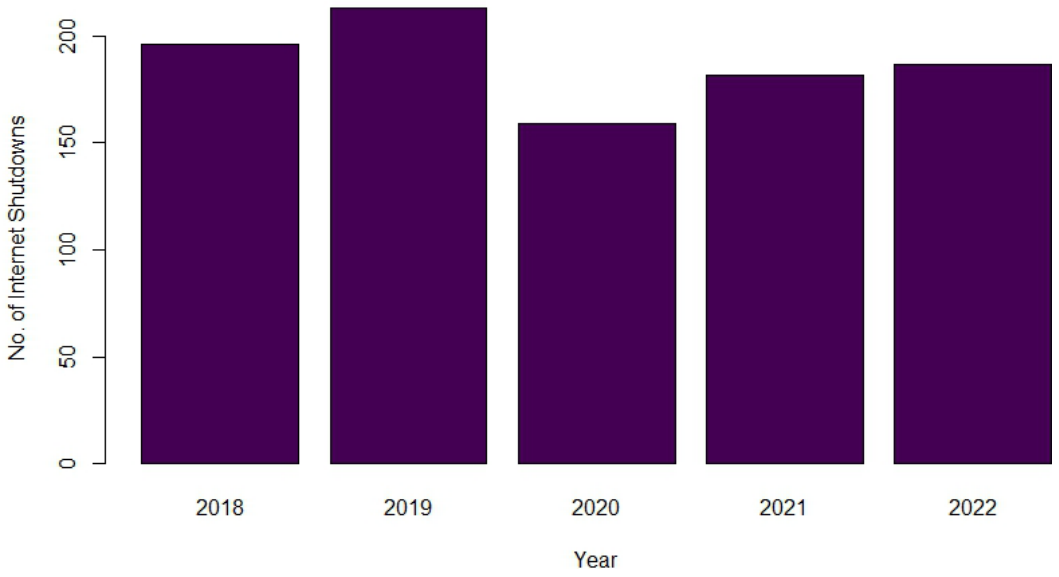
The dawn of the internet was expected to lead to a new wave of democratisation through global interconnectivity and rapid technological advancement.[1] The Arab Spring highlighted how technology, such as the internet, can be utilised as a crucial tool for democracy, by enabling greater accessibility to information as well as being a platform for public discussion and engagement. However, in the last two decades, following the evolution of the internet, there has been a growing trend in which the internet is becoming more censored around the world, and democracy itself is crumbling under its influence. The internet has evolved into a double-edged sword, as it can be used as tool by civilians to mobilise and express dissent, but it can also be used as a weapon against civilians to centralise power and suppress dissent. This is particularly highlighted by the phenomenon of internet shutdowns, which signifies an alarming disregard for democracy, human rights, and freedom of expression.

Access to the internet has become crucial to the realisation of human rights, with disruptions to online information increasingly being acknowledged by the United Nations as a violation of international human rights law. In 2022, governments across the globe shut down the internet 187 times. A notable example is the 2022 Somaliland shutdown in response to protests on the presidential election postponements. Another example is the throttling of internet access and specific Facebook features in response to protests on teacher salaries and COVID-19 restrictions in

1. Nerissa Muthayan, *"Internet Shutdowns Threaten Democracy in World's Biggest Voting Year"*, South African Institute of International Affairs, accessed August 10, 2024.

Jordan in 2020 and 2021.[2]

FIGURE 1.1: Annual Global Internet Shutdowns



This research study seeks to investigate the factors that influence an internet shutdown, particularly the factors that influence a government's decision to implement a shutdown during times of heightened political pressure such as elections and protests. This will be explored using regression models as well as other statistical models and instruments to evaluate if the implementation of internet shutdowns differ between democracies and non-democracies as well as between countries in different income groups, in the event of an election or protest. The rest of this introduction chapter delves deeper into the purpose and significance of this study, its research questions and objectives, as well as the limitations, ethical considerations and structure of the research report.

2. GPD and Access Now, *Evading Accountability through Internet Shutdowns: Trends in Africa and the Middle East*, technical report (Global Partners Digital and Access Now), accessed July 10, 2023.

1.2 Purpose of the Study

This research study aims to explore and identify the effects of various variables such as the degree of democracy on the implementation of internet shutdowns, during elections and protests, to foster a greater understanding of the phenomenon of internet shutdowns. The central assumption of this study is that states are rational actors whose actions and interests revolve around maximizing their chances of political survival and maintaining power. Thus, the decision to shut down the internet is ultimately a political decision and the two events in which political power is extremely vulnerable is during an election or a protest. This raises the question of whether internet access is being weaponised through the occurrence of internet shutdowns during elections or protests. This foundation of thinking has largely driven this research study, which seeks to identify which variables influence a government's willingness to implement an internet shutdown, as well as the way in which these variables underscore the decision to shut down.

1.3 Significance of the Study

The study's findings will add to the existing knowledge on the phenomenon of internet shutdowns. The significance of this study will vary depending on the strength of its findings in which I anticipate one of the following two scenarios:

In the first scenario, the findings may indicate that there is not a difference in the implementation of internet shutdowns during elections or protests in relation to the selected variables, such as the degree of democracy. These results will provide insight into the relationship between democracy and internet shutdowns as well as the common classification of internet shutdowns as 'anti-democratic'. It will also raise interesting questions on the political nature of internet shutdowns, questioning if the decision to shut down the internet is indeed a political one.

In the second scenario, the findings may suggest that there is indeed a difference in the implementation of internet shutdowns during elections or protests on the basis of several factors, such as the difference in income groups. These results will provide insight into the nature of internet shutdowns, illustrating the relationship

between internet shutdowns during elections and the selected variables as well as the relationship between internet shutdowns during protests and the selected variables. This will provide insight into the evolution of the internet as a tool or weapon, digital authoritarianism, freedom of expression, the nature of elections as well as protests and the relationship between technology and democracy.

Additionally, it will be interesting to examine if the results between internet shutdowns during elections and internet shutdowns during protests differ. This may provide insight into the political nature of elections and protests themselves, possibly indicating if one of the two events has higher stakes for political power.

1.4 Research Question

The findings of this study are intended to help answer the following questions:

1. **To what extent is a government's decision to implement a shutdown influenced by various political and socioeconomic factors?**

   In which the selected factors are:

   (a) Democracy (Regime Types)

   (b) Economic Development (Income Groups)

   (c) Internet Penetration

   (d) Education

2. **Does this influence differ depending on whether an internet shutdown occurs during an election or a protest?**

The first question aims to identify the nature of the relationship between the phenomenon of internet shutdowns and the various political/socioeconomic factors. It seeks to identify if each factor has an influence on a government's decision to implement a shutdown as well as the strength and association of this influence. The second question aims to clarify if the relationship between the phenomenon of internet shutdowns and the various political/socioeconomic factors differs depending on if the internet shutdown occurs during an election or a protest.

The first question focuses primarily on the influence of the factors whilst the second question focuses on the political environment in which the shutdowns occurs. This two-fold approach will enrich the analysis of this research study by the examining if internet shutdowns are a result of these specific factors, as well as if the influence of these specific factors on internet shutdowns differs during elections and protests. This first approach will provide insight into the relationship between internet shutdowns and the selected factors, and the second approach will provide insight into the relationship between internet shutdowns during elections and internet shutdowns during protests. The combination of both approaches will provide a comprehensive analysis into the complex phenomenon of internet shutdowns.

1.5 Research Objectives

The intended outcomes of this research study include:

- Understand the use of internet shutdowns as a tool used by governments during times of enhanced political pressure
- Understand how democracy and development may influence a government's willingness to shut down the internet
- Understand how a government's decision to shut down the internet during an election may differ from a government's decision to shut down the internet during a protest

1.6 Limitations

There are several limitations of this research study. The first limitation is the reliance on secondary data sources, which may not be comprehensive enough given the complexity and relative newness of the phenomenon of internet shutdowns. This can be aided through a literature review examining various components related to internet shutdowns. Secondly, this study focuses primarily on internet shutdowns and does not examine other forms of digital authoritarianism like censorship. This

limits its understanding on the overall relationship between digital authoritarianism and freedom of expression but allows it to provide a nuanced perspective on the relationship between digital authoritarianism in the form of internet shutdowns and freedom of expression. Lastly, this study does not explore the role of non-state actors in internet control which could be important for research in the future given the increasing role of non-state actors in the international system. However, this limitation is an unpreventable consequence of the scope of any research report, as no single report can examine a subject in its entirety. Thus, this limitation highlights a potential area for future works expanding on this research report.

1.7 Ethical Considerations

I reaffirm my commitment to the ethical standards set out by the University of the Witwatersrand's School of Social Sciences. My research study does not involve any contact with human participants thus, falling in the no-risk level category of the Human Research Ethics Committee (HREC Non-Medical). My study consists of the use of secondary, non-human, quantitative datasets. All the data sets used in this research study are Open-Source (publicly available). Thus, there is no requirement to apply for permission to use the data or for ethical clearance to conduct this study. I have obtained a School of Social Sciences Ethics Committee waiver. The ethics clearance/waiver number is: **WINTR2022/11/06.**

1.8 Report Structure

This research report consists of six chapters. This introduction chapter outlined the significance and scope of the research study. Chapter 2 consists of a literature review, providing a theoretical background to this study. The second chapter examines existing research on internet shutdowns under three main themes:

1. Technology and Democratisation
2. The Rise of Digital Authoritarianism
3. The Phenomenon of Internet Shutdowns

The second chapter also identifies a gap in the literature, in relation to the existing research on the factors that influence the implementation of internet shutdowns, which this research study aims to contribute to. Chapter 3 discusses the research design and methodology used in this study, identifying the various data sources and variables used throughout the study. Chapter 4 outlines the main findings of the study and Chapter 5 discusses these findings in relation to the research questions and objectives identified in this chapter. Lastly, Chapter 6 concludes the research study by summarising the key findings and identifying areas for future research on the implementation of internet shutdowns.

Chapter 2

Theoretical Background

2.1 Introduction

This chapter consists of a literature review of existing research related to this study on internet shutdowns. There is an increasing volume of studies focusing on internet control, online censorship, and internet shutdowns. However, existing literature on the factors influencing a government's decision to implement an internet shutdown is scarce, despite the rapid acceleration in shutdowns. This literature review explores the complex relationship between technology and democracy, the rise of digital authoritarianism and misinformation, and the phenomenon of internet shutdowns during elections and protests, particularly in relation to technological capacity and economic impact. It seeks to provide a comprehensive understanding of how technological advancements can both advance and undermine democracy.

2.2 Technology and Democratisation

The emergence of the internet was initially characterized by hopes for technology-driven waves of democratisation through global interconnectivity and rapid technological advancement, based on the assumption that a wider distribution of technology would strengthen democratic control and government accountability.[1] The 2011 Arab Spring was seen as the manifestation of this phenomenon, as the role of digital technology in the success of the civil uprisings in Tunisia and Egypt has

1. Kevin Koerner and Kevin Körner, "Digital Politics: AI, Big Data and the Future of Democracy," *Deutsche Bank Research*, 2019,

been internationally recognized.[2] The internet acted as the key tool for mobilisation during the protests, as it was the platform for the discussion of ideas, the spread of information and through which public consciousness was elevated.[3] This signifies how the internet has been used as an instrument to mobilise protests and provides insight into the potential motivations behind the possible weaponisation by the state of the internet through shutdowns.[4] This also signifies how the internet has become an important tool in the democratisation process, allowing for greater accessibility to the interests and opinions of citizens at various levels.[5] The use of technology, such as the internet, can play a crucial role in democratisation through the facilitation of political communication and enabling a population to engage in public discourse and access information.[6] The most visible impact of digital transformation on politics is through the widespread communication and exchange of information between individuals, governments, and organizations.[7]

2.3 The Rise of Digital Authoritarianism

Nearly three decades, after the initial euphoria and global penetration of digital technologies, the darker side of these technologies and their subsequent challenges are being increasingly recognized by citizens, governments, and society as a whole.[8] The affordability, accessibility and availability of connectivity and data have led to an unprecedented spread of misinformation and individualised manipulation with significant implications for mass-coordinated misinformation, micro-targeting of voters, public dialogue polarisation in democracies, hybrid warfare and distrust of democratic governments, and intensifying state control of information flow and public opinion in both authoritarian and democratic societies.[9]

2. Waheed Alhindi, Muhammad Talha, and Ghazali Sulong, "The Role of Modern Technology in Arab Spring," *Archives des sciences 1661-464X* 65 (September 2012): 1661–464.
3. Alhindi, Talha, and Sulong.
4. Julia Ryng et al., "Internet Shutdowns: A Human Rights Issue," *The RUSI Journal* 167, nos. 4-5 (July 2022): 50–63, accessed May 29, 2023.
5. Freedom House , *Freedom on the Net 2021 :The Global Drive to Control Big Tech*, technical report (Freedom House, 2021), accessed July 10, 2023.
6. Alhindi, Talha, and Sulong, "The Role of Modern Technology in Arab Spring."
7. Koerner and Körner, "Digital Politics: AI, Big Data and the Future of Democracy."
8. Koerner and Körner.
9. Koerner and Körner.

Statistics have shown that by October 2023, there were 5.3 billion internet users worldwide, an estimated 65.7% of the world's population. Furthermore, from this total, 4.95 billion (61.4% of the global population) were social media users.[10] With more than half the global population now online, internet control is becoming an increasingly powerful way to control civil society.

Digital authoritarianism is becoming a tool by which governments can control and track their citizens through technology, "inverting the concept of the internet as an engine of human liberation".[11] Over the last decade, we have witnessed an emerging global drive to control big tech, as an increasing number of governments have asserted their authority over technology companies in relation to online censorship and surveillance. The two main forms of internet control utilised by governments are restriction/disruption and digital surveillance. Existing studies on digital authoritarianism and online censorship classify internet shutdowns as a censorship tool being used by governments to moderate and monitor their citizens' online activity more than ever before.[12]

Global norms have also shifted towards greater online intervention by governments and the implementation of new laws on censorship and data collection that signifies a radical shift in the power balance between a state and its citizens, through the expanding forms of censorship.[13] Users' online activities are more moderated and monitored than ever before and the intensification of digital repression has led to an overall lack of confidence in government initiatives to regulate the internet in the aim of greater protection of user rights.[14]

10. World Bank , *World Bank Open Data*, accessed July 10, 2023.
11. Freedom House , *Freedom on the Net 2021 :The Global Drive to Control Big Tech.*
12. Freedom House ,
13. Ben Wagner, "Understanding Internet Shutdowns: A Case Study from Pakistan," 2018,
14. Freedom House , *Freedom on the Net 2021 :The Global Drive to Control Big Tech.*

In both authoritarian and democratic states, there is an increasing lack of transparency in relation to censorship decisions and the use of surveillance, as the majority of countries do not publicize their blocked websites nor is there an appeal process for censored content. Collecting information regarding shutdowns is also difficult as many governments deny involvement and often prevent companies from sharing information on networks being disrupted or slowed down. This highlights the need for further and more comprehensive research into the factors that influence the implementation of internet shutdowns.

2.4 The Phenomenon of Internet Shutdowns

Existing studies on internet shutdowns have classified it as a unique phenomenon, as it is seemingly more closely linked to human rights violations and threats to democracy than other forms of internet control and censorship, as shutdowns simultaneously deprive a society of accessing basic services, social connections, and economic opportunities.[15] Rydzak adopts this classification of shutdowns as a distinct phenomenon, "in societies with a rapidly growing digital user base, network shutdowns should be the most basic, crudest form of maintaining control over the wired populace. . . they are palpable, their effects are immediate, and they are a direct response (rather than a pre-emptive measure) to perceived threats".[16] Shutdowns restrict people's right to freedom of expression and access to information, which is a violation of the Universal Declaration of Human Rights, which states that people have the right to "seek, receive, and impart information and ideas through any media and regardless of frontiers".[17] The UN Human Rights Council has recognised that these rights also apply online. Another key impact of internet shutdowns is that shutting down the internet is an immediate safety and security issue, as citizens lose access to crucial information. This was a major issue in Kashmir during

15. Wagner, "Understanding Internet Shutdowns: A Case Study from Pakistan."

16. Jan Rydzak, "The Digital Dilemma in War and Peace: The Determinants of Digital Network Shutdown in Non-Democracies" (March 2016).

17. UNHCR, *A/HRC/50/55: Internet Shutdowns: Trends, Causes, Legal Implications and Impacts on a Range of Human Rights - Report of the Office of the United Nations High Commissioner for Human Rights*, accessed July 10, 2023.

the pandemic as healthcare officials relied on the internet to access medical information.[18]

2.4.1 Internet shutdowns in relation to technological capacity

Wilson argues that decisions made by governments on internet control are dependent both on a state's internet infrastructure and the technical proficiency of a regime.[19] Wilson identifies the three main approaches undertaken by governments to control different components of the internet as attacking individual nodes, controlling the network, and controlling the application layer.[20] Governments with a strong technological capacity can attack nodes through the utilization of viruses, spyware, and malware to track, monitor, and control individual users.[21] An example of this would be the United Arab Emirates' 2011 banning of BlackBerry encryption messages, which allowed the government to intercept messages between individuals and small businesses.[22] Governments with a weaker technological capacity will seek to 'control the network' instead.

The internet is a constructed system of stacked network 'layers', in which each layer uses and expands the functions provided by the previous layers. Keremoglu and Weidmann distinguish between three layers: the infrastructure layer, the network layer, and the application layer.[23] The infrastructure layer consists of hardware and cables to establish and maintain an internet connection. Governments are often involved in the building and maintenance of general infrastructure for communication and play a significant role in access allocation and service provision. Governments are also able to restrict country-wide access by throttling bandwidth to

18. GPD and Now, *Evading Accountability through Internet Shutdowns: Trends in Africa and the Middle East*.
19. Steven Lloyd Wilson, "How to control the Internet: Comparative political implications of the Internet's engineering," *First Monday* 20, no. 2 (January 2015), https://doi.org/10.5210/fm.v20i2.5228, https://firstmonday.org/ojs/index.php/fm/article/view/5228.
20. Wilson.
21. Eda Keremog˘lu and Nils Weidmann, "How Dictators Control the Internet: A Review Essay," *Comparative Political Studies* 53 (March 2020): 001041402091227, https://doi.org/10.1177/0010414020912278.
22. J Halliday, *"UAE to tighten Blackberry restrictions"*, The Guardian, accessed May 18, 2023.
23. Keremog˘lu and Weidmann, "How Dictators Control the Internet: A Review Essay."

the extent that browsing the internet or specific applications becomes unlikely.[24]

The network layer ensures the proper route of data packets from source to destination and is highly susceptible to government intervention. Governments can systematically censor information and communication through the network layer's filtering mechanisms that are based on specific keywords or senders/recipients of data packets.[25] The most common example of internet censorship in which a government seeks to control what content its citizens can view and which applications they can access is China's 'Great Firewall', which blocks connections to specific websites and services, thus establishing a highly regulated "national intranet".[26]

The application layer includes software tools that allow users to send and receive information over a network. Most of the existing body of research on internet shutdowns focuses on autocratic interference with the application layer through customized malware. The approach of customized malware has been utilised by Tunisia and Egypt to access personal email and social media accounts in order to track anti-regime messages.[27] However, these kinds of sophisticated attacks require a high technological capacity. Thus, it is much more feasible for regimes with weaker IT capabilities to enable domain name system (DNS) blocking of a specific website or attacks on the internet infrastructure itself (internet shutdowns).[28]

In order to shut down the internet, the government needs to control the network and application layer. Whilst scholars have assumed that is unlikely for governments to control the network and application layer simultaneously, internet shutdowns are increasing as governments have learned to control critical aspects of the infrastructure.[29] Governments have created this capacity by securing the majority state ownership of internet service providers and private service providers have

24. Wilson, "How to control the Internet: Comparative political implications of the Internet's engineering."
25. Keremogˇlu and Weidmann, "How Dictators Control the Internet: A Review Essay."
26. Halliday, *"UAE to tighten Blackberry restrictions"*.
27. Wilson, "How to control the Internet: Comparative political implications of the Internet's engineering."
28. Keremogˇlu and Weidmann, "How Dictators Control the Internet: A Review Essay."
29. Patricia Vargas-Leon, "Tracking Internet Shutdown Practices: Democracies and Hybrid Regimes" (January 2016), 167–188, ISBN: 978-1-349-57846-7, https : / / doi . org / 10 . 1057 / 9781137483591_9.

also been found to comply with state-ordered shutdowns.[30] Private telecommunications providers often comply out of fear of political harassment, victimisation and threats of arbitrary imprisonment, highlighting the role of the systemic unequal balance of power between governments and telecommunications providers in internet shutdowns.[31] Ultimately, the ownership and control of network communication systems provide governments with the power towards restricting or slowing down digital communications, further supporting the conceptualisation of internet shutdowns as a form of digital authoritarianism. Scholars have also established that internet shutdowns are more common amongst regimes with limited technological capacity and are the most extreme form of internet censorship. Internet censorship, content filtering and online counter-speech are alternatives to internet shutdowns that require a higher technological capacity and digital literacy.[32]

2.4.2 Internet shutdowns during elections and protests

Studies have also classified internet shutdowns as "a form of violence in themselves, stripping people's freedoms of expression, association, assembly and privacy".[33] Governments utilise internet shutdowns as a tool to maintain power and ensure their political survival. A study on internet shutdown trends in Africa and the Middle East found that political instability and conflict often coincide with internet shutdowns in the Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA) regions.[34] A UN report on internet shutdowns also stated that "Almost half of all shutdowns recorded by civil society groups between 2016 and 2021 were carried out in the context of protests and political crisis, with 225 shutdowns recorded during public demonstrations".[35] A government's power and political survival are highly vulnerable during an election or protest, which is the reason why this research study examines internet shutdowns during elections and

30. Tina Freyburg and Lisa Garbe, "Authoritarian Practices in the Digital Age| Blocking the Bottleneck: Internet Shutdowns and Ownership at Election Times in Sub-Saharan Africa," *International Journal of Communication* 12, no. 0 (2018), ISSN: 1932-8036, https://ijoc.org/index.php/ijoc/article/view/8546.

31. Keremog˘lu and Weidmann, "How Dictators Control the Internet: A Review Essay."

32. Wilson, "How to control the Internet: Comparative political implications of the Internet's engineering."

33. Ryng et al., "Internet Shutdowns."

34. Tonderayi Mukeredzi, "Uproar Over Internet Shutdowns: Governments Cite Incitements to Violence, Exam Cheating and Hate Speech," 2017,

35. Access Now, *KeepItOn: Fighting Internet Shutdowns around the World*, accessed July 10, 2023.

protests.

The Arab Spring has shown how the internet can be used as a digital communication tool for mobilisation during protests. Internet shutdowns are increasingly occurring during mass protests and these shutdowns are often imposed as short-term measures to quell protests, by restricting access to information to suppress citizen mobilisation. This impacts the ability of citizens to peacefully demonstrate, receive up-to-date information in times of political unrest and "show the world what's happening".[36] By shutting down the flow of information and suppressing digital resistance, governments are able to create a sense of fear and powerlessness among the population it is trying to regain control over.[37]

Violence prevention has also been identified as a key justification behind government decisions to enable internet shutdowns in Mukeredzi's study of internet shutdowns in Africa and Rydzak's study of internet shutdowns in Indian states.[3839] Thus, the goals of maintaining security and suppressing dissent are usually interrelated and often more than one potential cause can be behind a government's choice to enable a shutdown, "Many of the shutdowns occur in the context of political rallies, elections, and public assemblies. Although there are clear security risks associated with such events, it remains an open question: What are the characteristics of a government that makes it more likely to select internet shutdowns, instead other forms of online censorship, tactics of digital repression, or offline policies?"[40] A protest in August 2022 in Somaliland resulted in an internet shutdown whilst a similar protest in Somaliland in December 2022 did not result in a shutdown.[41] This raises the question of why the government chose to evoke a shutdown during the August protest but not during the December protest. This question encapsulates the crux of this research study, which aims to identify what factors influence a government's decision to shut down the internet.

36. Kiran Vinod Bhatia et al., "Protests, Internet Shutdowns, and Disinformation in a Transitioning State," *Media, Culture & Society*, February 2023, 016344372311555, ISSN: 0163-4437, 1460-3675, accessed July 10, 2023, https://doi.org/10.1177/01634437231155568.

37. Rydzak, "The Digital Dilemma in War and Peace."

38. Mukeredzi, "Uproar Over Internet Shutdowns: Governments Cite Incitements to Violence, Exam Cheating and Hate Speech."

39. Rydzak, "The Digital Dilemma in War and Peace."

40. Wagner, "Understanding Internet Shutdowns: A Case Study from Pakistan."

41. Access Now, *KeepItOn: Fighting Internet Shutdowns around the World*.

2.4.3 The economic impact of internet shutdowns

Internet access is vital for freedom of expression and a range of other economic and social rights. Digital technology has become crucial for economic development and has expanded its role in the international economy as a result of both developed and developing countries becoming increasingly dependent on the internet as a part of everyday life. As governments begin to digitize and automate fundamental social security programs, internet access is becoming increasingly fundamental for the attainment of the rights to social security, education and employment.[42] By reducing economic activity as a result of a lack of digital connectivity, shutdowns lead to reduced profits for local businesses, lower tax revenues and lower Gross Domestic Product (GDP).[43] Thus, internet shutdowns lead to cumulative economic uncertainty causing disincentives to invest and presenting a risk for businesses and investors building infrastructure or developing services. Governments reduce productivity by disrupting access to digital services and the decision to implement an internet shutdown has detrimental financial consequences. Internet shutdowns cost the global economy $24.6 billion in 2022, affecting 710.8 million people.[44] India's shutdowns alone in 2022 resulted in an estimated 1533 hours of intentional internet downtime costing the Indian economy $184.3 million highlighting how shutdowns are not only a violation of citizens' digital rights but are ultimately also acts of national economic self-harm.[45]

2.5 Conclusion

As indicated by this literature review, existing literature has classified internet shutdowns as a form of digital authoritarianism, a unique phenomenon, and a form of violence. There has been an identification of the occurrence of shutdowns during

42. Human Rights Watch and Internet Freedom Foundation, *"No Internet Means No Work, No Pay, No Food: Internet Shutdowns Deny Access to Basic Rights in "Digital India"*, Human Rights Watch, accessed August 21, 2023.

43. Maya Vishwanath Theodora S Rehan M, *"Digital Disruption: Measuring the Social and Economic Costs of Internet Shutdowns Throttling of Access to Twitter"*, Tech Policy Press, accessed March 21, 2024.

44. Simon Migliano Samuel Woodhams, *"Government Internet Shutdowns Have Cost $ 53 Billion Since 2019"*, TOP10VPN, accessed March 21, 2024.

45. Samuel Woodhams.

elections and protests as well as the economic impact of these shutdowns. However, there is a lack of comprehensive research into how various factors, such as regime type or income group, may influence the implementation of shutdowns during elections or protests. My research aims to address the aforementioned gap in the literature on internet shutdowns, elections and protests by examining the factors that may influence a government's decision to implement an internet shutdown. The next chapter will explore the analytical component of this research study, discussing the research methodology used in this research study to understand the factors that influence the implementation of internet shutdowns during elections and protests, in order to understand the impact of internet shutdowns on freedom of expression and democracy.

Chapter 3

Research Methodology

3.1 Introduction

This chapter discusses the research methodology used in this research study to understand the factors that influence the implementation of internet shutdowns during elections and protests. The chapter begins by providing an overview of the research design of the study, outlining its quantitative research methods and units of analysis, and then discussing the sample of countries used in the study. The chapter proceeds to provide a comprehensive overview of the dependent, independent, and control variables included in the study. Lastly, the chapter provides an outline of various data methods utilised in the study.

3.2 Research Design

3.2.1 Overview of Research Design

This research study has a quantitative research design. Quantitative research methods focus on objective measurements and the statistical or numerical analysis of data sourced from polls, questionnaires, or surveys.[1] It also includes the statistical manipulation of pre-existing data using computational techniques to determine the relationship between an independent variable and a dependent or outcome variable within a population.[2]

1. J. W. Creswell, *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (2013), accessed July 10, 2023.
2. Creswell.

This study consists of two types of quantitative research: descriptive research and correlation research. Descriptive research aims to describe the current status of an identified variable and is used to describe the characteristics of a population.[3] Correlation research uses statistical data to determine the extent of a relationship between two or more variables and recognizes trends and patterns in data.[4] This research design is highly suitable for this study as it is comprehensive through gathering insight from both descriptive research and correlation research. This comprehensive approach allows for the identification of many different patterns, which will lead to the variables being multi-dimensional, allowing the study to identify interesting correlations between variables.

3.2.2 Multivariate Logistic Regression Model

Multivariate Regression

The multivariate regression model is commonly used in statistical modelling to examine complex connections between various data sources, as multivariate regression examines how several predictors simultaneously influence a single outcome. This model is used to explore how various predictors, such as regime type and population size, influence the implementation of an internet shutdown. This regression model is suitable for this study for several reasons including its ability to handle several variables simultaneously enabling the study to examine the impact of several independent variables on a single dependent variable whilst also enabling the study to control for confounding variables, providing a clearer, more accurate understanding of the complex relationship between variables.

Logistic Regression

The logistic regression model is commonly used in statistical modelling for analysing binary outcomes, where the dependent variable is categorical, usually with two possible values. Using a logistic function, this model estimates the probability of an event occurring based on one or more predictor variables. This model is used to determine the likelihood of a specific event occurring, such as the implementation of an internet shutdown, based on predictors such as income group and education.

3. Creswell, *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*.
4. Creswell.

Multivariate Logistic Regression

Multivariate logistic regression combines the principles of logistic regression with the capability to analyse multiple predictors simultaneously. This model is used to examine how several predictors collectively influence a binary outcome, such as the occurrence of internet shutdowns during protests or elections. The inclusion of several independent variables allows the research study to examine the combined effects of various factors on the likelihood of an internet shutdown while accounting for interactions between these predictors. Thus, the multivariate logistic regression model will also determine how strong the relationship is between each variable, examining for example if the factors influencing the occurrence of an internet shutdown may differ depending on the occurrence of an election or protest. The ability of a multivariate logistic regression model to explore interactions between variables is particularly useful in the context of internet shutdowns, where politics, economics, and technology interact in increasingly interdependent ways.

In the multivariate logistic regression models used in this study, the key outcome variable is internet shutdowns during elections or protests.

There are a total of six variables being utilised in this study:

1. Degree of Democracy (Regime Type)
2. Income Group (GDP per Capita)
3. Education
4. Internet Penetration
5. Population
6. Unemployment

3.2.3 Programming Software

This research study was conducted using primarily R programming through the integrated development environment of RStudio. R was selected for this study as a result of it being a very flexible and powerful software for statistical analysis and

having strong graphics capabilities.

The following 12 R packages were primarily used in RStudio for this research study: dplyr, plyr, readxl, tidyverse, countrycode, stargazer bruceR, lme4, stringr, psych, car, viridis.

3.2.4 Units of Analysis

The units of analysis for this study are states, which refers to “a nation or territory considered as an organized political community under one government”.[5] This research study will identify if a state experiences a shutdown on the basis of if a state experiences “an intentional disruption of the internet or electronic communications rendering them inaccessible or effectively unusable, for a specific population or within a location".[6]

3.3 Investigation Sample

There are 171 countries included in this research study.

These countries are: Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Côte d’Ivoire, Democratic Republic of Congo, Denmark, Djibouti, Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, eSwatini, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico,

5. Rydzak, “The Digital Dilemma in War and Peace.”
6. Access Now, *KeepItOn: Fighting Internet Shutdowns around the World*.

Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, North Macedonia, Norway, Oman, Pakistan, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Vietnam, Zambia and Zimbabwe.

In order to meet the criteria to be included as a sample country in this research study, a country needed to experience one or more of the following events during the period of 2019 to 2022: an internet shutdown, an election or a protest.

The period from 2019 to 2022 was selected as the sample period for this research study based on the availability of data, in an effort to ensure that this study could leverage current and consistent datasets, in order to enhance the accuracy and relevancy of its findings to current policy and decision-making processes. This period includes several significant global events and trends, including the world before, during, and after the COVID-19 pandemic, each with comprehensive economic, social, and political implications. This research study is not longitudinal. Therefore, this study does not capture how the relationship between the selected political, economic and social factors and internet shutdowns evolves over time. By focusing on the specific time period of 2019 to 2022, this research study aims to understand and provide insights into the contemporary realities and repercussions of internet shutdowns and their associated factors.

3.4 Dependent Variable: Internet Shutdowns

3.4.1 General Overview

This section of Chapter 3 outlines the formation of the dependent variable for this research study. This research study consists of two dependent variables of internet

shutdowns during elections and internet shutdowns during protests, which will be used in separate multivariate regression models.

3.4.2 Internet Shutdowns

Internet shutdowns are defined as "an intentional and complete disruption of fixed-line or mobile Internet, ordered pursuant to the authority of the state, that renders the Internet inaccessible or unusable for a specific population, often to exert control over the flow of information".[7] Internet shutdowns can occur through 'throttling' or a 'kill-switch shutdown'. "Throttling" refers to the deliberate slowing down of internet connection speeds and has also been identified as an alternative tactic used by the government in lieu of a 'kill-switch shutdown'.[8] "Kill-switch shutdowns", are shutdowns in which the government disconnects the entire internet by blocking all access to fixed-line or mobile services instead, of blocking specific websites or slowing down internet speeds.[9]

This research project requires an internet shutdowns variable, that documents the occurrence and location of shutdowns. The internet shutdown variable for this study was measured using data from the #KeepItOn project.[10] The #KeepItOn Shutdown Tracker Optimization Project (STOP) documents shutdowns from 2016 to 2022, and provides information on a shutdown's duration, geographical scope, affected network and cause.[11] It also documents who ordered the shutdown (whether it was ordered by a local or executive body of government) as well as the official justification behind the shutdown. Shutdowns are documented if the disruption duration is longer than one hour or if continuous disruptions are attributed to the same cause. This research study did not differentiate between the frequency, length, type or extent of the shutdown but focused primarily on the occurrence of a shutdown between 2019 and 2022.

The internet shutdown variable was created by downloading four different annual

7. Kathuria Rajat et al., "The Anatomy of an Internet Blackout: Measuring the Economic Impact of Internet Shutdowns in India," accessed July 10, 2023.
8. Rajat et al.
9. Wagner, "Understanding Internet Shutdowns: A Case Study from Pakistan."
10. Access Now, *KeepItOn: Fighting Internet Shutdowns around the World*.
11. Access Now, *#KeepItOn STOP Data 2016-2022 [Public]*, 2023, accessed July 10, 2023.

data sets for the period of 2019 to 2022. Each data set contained variables on shutdown date, country, region, duration of shutdown, reason for shutdown, and affected services. Each data set was first individually cleaned to remove unnecessary variables and missing values. Several components of individual variables were renamed to match the variables of other data files, as a result of discrepancies between the annual data sets. This included the geographical scope of shutdowns in the 2020, 2021 and 2022 data sets which were recoded from if it affected one or more city, state, province or region to reflect a national, regional and local scope. The geographical scope of shutdowns in the 2019 data set was also recoded from numbered levels to reflect a national, regional and local scope. The four data sets were then merged into a single data set of shutdowns between 2019 to 2022 and cleaned further.

In total, there are 846 observations of internet shutdowns from 2019 to 2022 included in this study.

3.4.3 Internet Shutdowns and Elections

This research study requires an internet shutdown during elections variable, that documents the occurrence and location of shutdowns during elections, as well as the occurrence of elections that did not result in a shutdown. This requires both an internet shutdown variable and an election variable. This research study identified election-related shutdowns based on whether an internet shutdown occurred on the day of an election.

Elections

To examine if an election occurred, the research study utilised data from the International Foundation for Electoral Systems (IFES) ElectionGuide, which is a comprehensive online source of verified election information.[12] The ElectionGuide provides detailed election information, such as which country an election occurred in, the reason for an election (presidential or parliamentarian), the number of registered voters, the number of valid votes and the percentage of voter participation (based on registration and voter turnout). This research study did not distinguish

12. IFES, *IFES Election Guide*, 2023, accessed July 10, 2023.

between the type of election (presidential or parliamentarian) but focused only on the occurrence of an election anytime between 2019 and 2022.

The election variable was created by downloading an IFES ElectionGuide data set, which consisted of 309 observations and 9 variables. These variables included election date, country, and election type. This data set was then cleaned, which involved removing unnecessary variables, renaming variables, converting the time to a timestamp (changing the date to year-month-date format), changing the class of variables and adding a country code variable.

Internet shutdowns during elections

The election data set and internet shutdown data set were merged into a single data set using country code to create a data set reflecting internet shutdowns and elections. The formulation of the internet shutdowns during elections variable will be discussed further in the following chapter.

3.4.4 Internet Shutdowns and Protests

This research study requires an internet shutdown during protests variable, that documents the occurrence and location of shutdowns during protests, as well as the occurrence of protests that did not result in a shutdown. This requires both an internet shutdown variable and a protest variable. This research study identified protest-related shutdowns based on whether a national shutdown occurs on the day of a protest.

Protests

Protests are defined as "an in-person public demonstration in which the participants do not engage in violence, though violence may be used against them. Events include individuals and groups who peacefully demonstrate against a political entity, government institution, policy, group, tradition, business, or other private institution".[13] This research study requires a protest variable, that documents the occurrence and location of protests. The protest variable will be measured using

13. ACLED, *ACLED Data: Bringing Clarity to Crisis*, accessed July 10, 2023.

ACLED data. ACLED data is an “event-based dataset, which contains information on political violence, demonstrations, and protests around the world. ACLED data documents the event type, involved actors, location, date, and other characteristics of these incidents".[14] For the purposes of this research study, there will be no distinction between the various types of protests instead, the focus will be only on if a protest occurred during the period of 2019 to 2022.

The protest variable was created by downloading an ACLED data set, which consisted of 598 266 observations and 31 variables. These variables included event date, event type, country, region, actor type, target type, and fatalities, covering the period from 1900 to 2022. This data set was then cleaned, which involved removing unnecessary variables, renaming several variables, and adding a country code variable.

Internet shutdowns during protests

The protest data set and internet shutdown data set were merged into a single data set using country code to create a data set reflecting internet shutdowns and protests. The formulation of the internet shutdowns during protests variable will be discussed further in the following chapter.

3.5 Independent Variables: Democracy and Development Indicators

3.5.1 General Overview

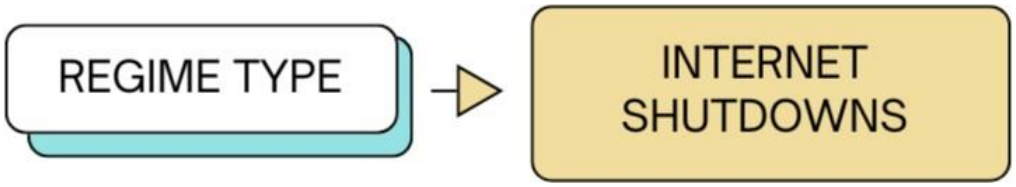
This section of Chapter 3 outlines the formation of the various independent variables of this research study, which are the political and developmental factors that are expected to influence a government’s decision to shut down the internet, particularly the degree of democracy, income group, education, and internet penetration.

14. ACLED, *ACLED Data: Bringing Clarity to Crisis*.

3.5.2 Degree of Democracy (Regime Type):

The level of democracy in a country may significantly influence a government's decision to implement an internet shutdown, as countries with a higher degree of democracy are likely to experience greater scrutiny and challenges against measures to restrict internet access. While elections are often seen as a symbolic indicator of democracy, they are not the defining feature of a democracy, as many countries with lower levels of democracy also conduct elections. These elections are typically not free, fair or competitive and are used as a tool by authoritarian regimes to establish a false sense of legitimacy. Thus, the relationship between democracy and elections is complex and cannot be reduced to a simple distinction between regimes that hold elections and those that do not.

FIGURE 3.1: Causal Diagram of Democracy and Internet Shutdowns



For the degree of democracy variable, a measure of a state's degree of democracy based on the quality of its elections within a broader framework of democratic governance is required. The regime type (degree of democracy) variable for this research study was measured using the V-Dem Electoral democracy indicator (v2x-polyarchy), which measures "To what extent is the ideal of electoral democracy in its fullest sense achieved?".[15] The electoral principle of democracy aims to "embody the core value of making rulers responsive to citizens, achieved through electoral competition for the electorate's approval under circumstances when suffrage is extensive; political and civil society organizations can operate freely; elections are clean and not marred by fraud or systematic irregularities; and elections affect the

15. V-Dem, *The V-Dem Dataset – V-Dem*, 2023, accessed July 10, 2023.

composition of the chief executive of the country".[16] Thus, electoral democracy is fundamental to any other notion of representative democracy (such as liberal, participatory etc), making it a suitable measure of democracy for the purposes of this research study.

This indicator has an interval scale from low to high, ranging from 0 to 1. The index is formed using an average of two measures, the first of which is the weighted average of the indices for freedom of association, clean elections, freedom of expression, elected officials, and suffrage, and the second is the five-way multiplicative index between those indices.[17] Thus, it is a compromise between a straight average and strict multiplication, allowing for both partial compensation in a single sub-component in place of a lack of polyarchy in other components whilst avoiding penalising countries that are not strong in a single sub-component in accordance with the "weakest link" argument.[18]

TABLE 3.1: Summary of V-dem Polyarchy Indices

Indice	**Measure**
v2x_frassoc_thick	Freedom of Association
v2xel_frefair	Clean Elections
v2x_freexp_altinf	Freedom of Expression
v2x_elecoff	Elected Officials
v2x_suffr	Suffrage

The degree of democracy variable was created by downloading a V-dem data set, which consisted of 27 555 observations and 1818 variables. These variables included measures of political institutions, civil liberties, electoral processes, and government effectiveness, covering the period from 1900 to 2021.

The degree of democracy data set was filtered to only contain data from 2019 and then cleaned to remove unnecessary variables and missing values. The use of 2019

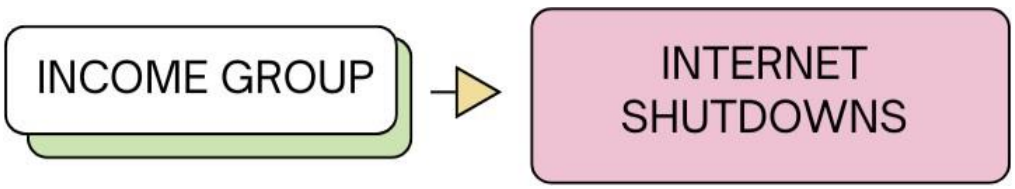
16. V-Dem, *The V-Dem Dataset – V-Dem*.
17. V-Dem.
18. V-Dem.

estimates for the 2019 to 2022 period was based on data availability and consistency, with differences between the observation years and 2019 considered negligible. Several variables were also renamed, such as country name and the polyarchy variable, to ensure consistency across all data sets included in the research study.

3.5.3 Income Group (GDP per capita):

Income groups may significantly influence a government's decision to implement an internet shutdown in light of the strong economic impact of shutdowns, which was discussed in Chapter 2. Higher-income countries are likely to face higher national and international economic costs for limiting internet access, which may act as a strong deterrent to shutdowns. The inclusion of income groups in this research study will ultimately foster a greater understanding of the complex interplay between economic conditions and digital restrictions.

FIGURE 3.2: Causal Diagram of Income Group and Internet Shutdowns



For the income group variable, a measure of a state's economic development is needed. The income group variable in this research study was measured using data from the widely recognised World Bank World Development Indicators Database, which covers the period from 1960 to 2021. The income group variable was measured using GDP per capita, which is measured in the current U.S. dollars and is defined as "gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for

depletion and degradation of natural resources".[19] Thus, GDP per capita represents the average economic productivity of each person in a country, providing a measure of the average standard of living and well-being in a country, making it an appropriate measure of income group for this research study. The World Bank GDP per capita indicator is recorded annually using the weighted average aggregation method and the sources are the World Bank national accounts data and OECD national accounts data files.

The income group variable was created by downloading the GDP per capita data set from the World Bank World Development Indicators Database, which consisted of 266 observations and 65 variables. These variables included country name, country code, indicator name, indicator code, and annual 'GDP per capita' data covering the period from 1960 to 2022.

The income group data set was filtered to only contain data from 2019 and then cleaned to remove unnecessary variables and missing values. The use of 2019 estimates for the 2019 to 2022 period was based on data availability and consistency, with differences between the observation years and 2019 considered negligible. Several variables were also renamed, such as country name and country code, to ensure consistency across all data sets included in the research study.

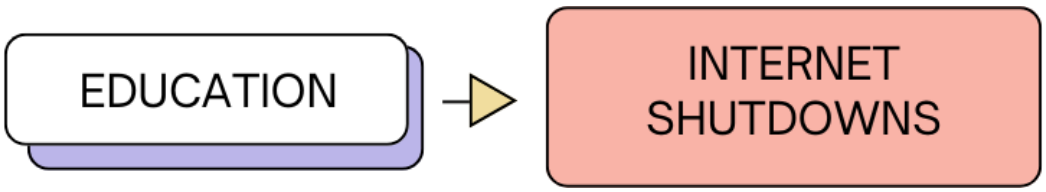
3.5.4 Education:

Education levels may significantly influence a government's decision to implement an internet shutdown, as it often reflects a population's awareness of their rights to freedom of expression and access to information, which would influence a population's perception of and response to internet shutdowns. Countries with higher education levels may encounter increased resistance to shutdowns, which may impact a government's decision to shut down the internet.

For the education variable, a measure that reflects a state's level of education is needed. The education variable was measured using the primary completion rate

19. World Bank , *World Bank Open Data*.

FIGURE 3.3: Causal Diagram of Education and Internet Shutdowns



variable from the World Bank World Development Indicators Database. This indicator was jointly developed by the World Bank and the UNESCO Institute for Statistics and is increasingly being used as a fundamental indicator of an education system's performance by reflecting an education's system coverage and the educational attainment of students, making it a suitable measure of education for this research study.

Primary completion rate is the "rate or gross intake ratio to the last grade of primary education is the number of new entrants (enrolments minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education".[20] The World Bank's primary competition rate indicator is measured annually as a percentage of the relevant age group, through the weighted average aggregation method, using data from the UNESCO Institute for Statistics. It is important to note that the data limitations of the indicator prevent adjustments for students who drop out of school during the final year of primary education thus, this is a proxy rate that should be perceived as an upper estimate of the actual primary completion rate.

The education variable was created by downloading the primary completion rate data set from the World Bank World Development Indicators Database, which consisted of 266 observations and 65 variables. These variables included country name, country code, indicator name, indicator code, and annual 'primary completion rate' data covering the period from 1960 to 2022.

The education data set was filtered to only contain data from 2019 and then cleaned

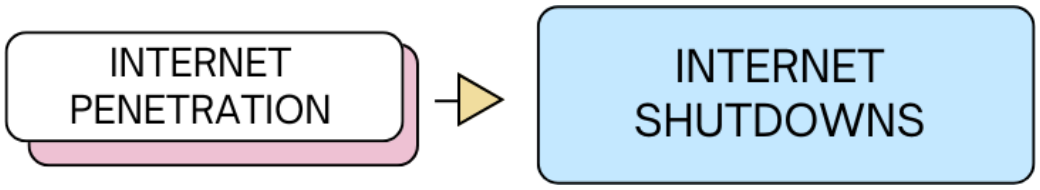
20. World Bank , *World Bank Open Data*.

to remove unnecessary variables and missing values, enhancing the data quality and improving the analytical accuracy of the research study. The use of 2019 estimates for the 2019 to 2022 period was based on data availability and consistency, with differences between the observation years and 2019 considered negligible.

3.5.5 Internet Penetration:

Internet penetration levels may significantly influence a government's decision to shut down the internet, as it largely determines the extent of a population that is impacted by an internet shutdown, shaping the political and economic implications of a shutdown. Countries with higher internet penetration levels may experience more significant disruptions to their economies leading to greater social unrest and political accountability, which could influence a government's decision to implement a shutdown.

FIGURE 3.4: Causal Diagram of Internet Penetration and Internet Shutdowns



For the internet penetration variable, a measure that reflects the percentage of a state's population that has access to the internet is needed. The internet penetration variable was measured using the 'Individuals using the Internet' indicator from the World Bank Development Indicators Database, which is recorded annually, using the weighted average aggregation method. It is defined as "Individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, game machine, digital TV etc".[21] This indicator uses data from the International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database and inclusively encompasses the various devices through which individuals access the internet, making it

21. World Bank , *World Bank Open Data*.

an ideal measure of internet penetration for this research study.

The internet penetration variable was created by downloading the individual using the internet data set from the World Bank World Development Indicators Database, which consisted of 266 observations and 65 variables. These variables included country name, country code, indicator name, indicator code, and annual 'individuals using the internet' data covering the period from 1960 to 2022.

The internet penetration data set was filtered to only contain data from 2019 and then cleaned to remove unnecessary variables and missing values, enhancing analysis efficiency and minimising the risk of technical errors in the research study. The use of 2019 estimates for the 2019 to 2022 period was based on data availability and consistency, with differences between the observation years and 2019 considered negligible.

3.6 Control Variables

3.6.1 General Overview

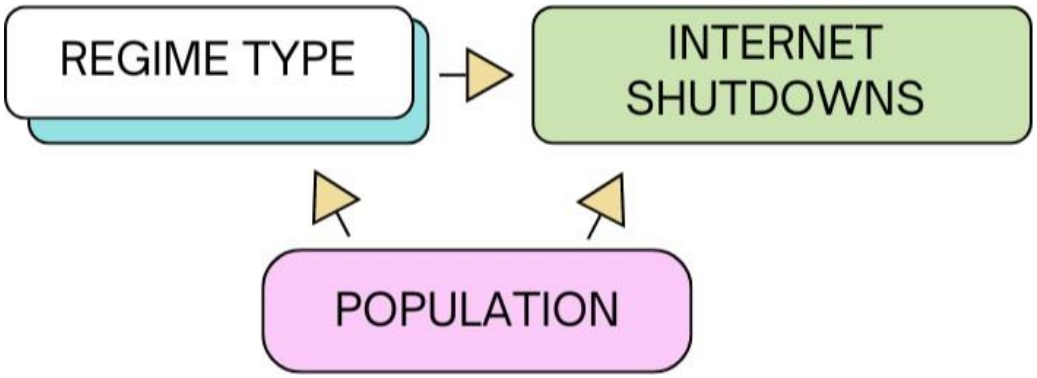
This section of Chapter 3 outlines the formation of two control variables, population and unemployment, to reduce potential factors that may influence both the independent variables like the degree of democracy and the dependent variable of internet shutdowns. Thus, the inclusion of control variables in the research study will lead to a more robust and credible analysis of how these political and developmental factors may influence a government's decision to shut down the internet

3.6.2 Control Variable 1 - Population:

Population size may influence a state's democracy level as the stability of democratic institutions is often shaped by a country's population size. A larger population might pose challenges to the development and maintenance of political institutions as a result of the increased complexity of governance. Larger populations may also result in more diverse and potentially conflicting interests, requiring more complex and robust political mechanisms Furthermore, population size could

also influence internet shutdowns by determining the impact of shutdowns, as in a larger population more people will be disrupted by a government's decision to shut down the internet.

FIGURE 3.5: Causal Diagram with Population as a Control



For the population size variable, a measure that reflects the total number of people in a state is needed. The population variable in this research study was measured using the population indicator from the World Bank World Development Indicators database, which defines population as "the de facto definition of population, which counts all residents regardless of legal status or citizenship".[22] The World Bank population indicator is recorded annually using the sum aggregation method and is usually based on national population censuses, making it a suitable measure for this research study.

The population size variable was created by downloading the population data set from the World Bank World Development Indicators Database, which consisted of 266 observations and 65 variables. These variables included country name, country code, indicator name, indicator code, and annual 'population size' data covering the period from 1960 to 2022.

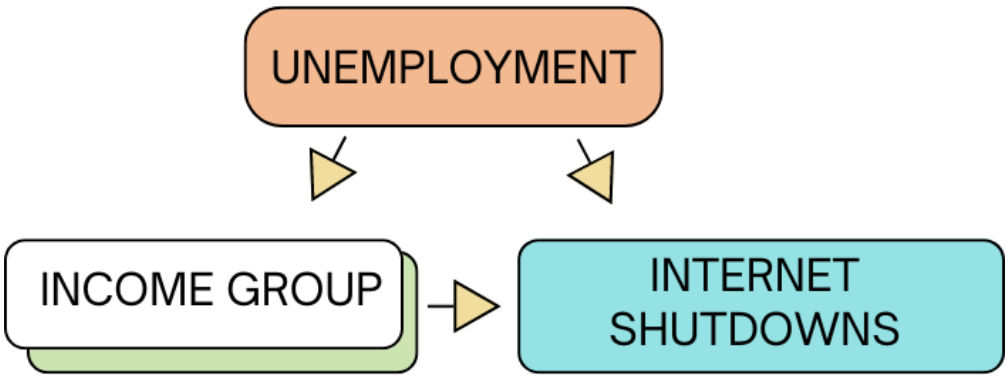
22. World Bank , *World Bank Open Data*.

The population data set was filtered to only contain data from 2019 and then cleaned to remove unnecessary variables and missing values, improving the reliability and validity of the research study findings. The use of 2019 estimates for the 2019 to 2022 period was based on data availability and consistency, with differences between the observation years and 2019 considered negligible.

3.6.3 Control Variable 2 - Unemployment:

Unemployment rates directly influence income groups and poverty levels, reflecting greater economic instability and often correlate with greater social unrest and government dissatisfaction, which may influence a government's decision to implement an internet shutdown. Thus, by using unemployment as a control variable, this research study will be able to isolate and analyse the independent influence of income groups on a government's decision to restrict internet access, without the confounding influence of unemployment rates.

FIGURE 3.6: Causal Diagram with Unemployment as a Control



For the unemployment variable, a measure that reflects the proportion of a state's working force that is without a job is needed. The unemployment variable in this research study was measured using the unemployment rate indicator from the World Bank World Development Indicators database, which refers to "the share of the labour force that is without work but available for and seeking employment".[23]

23. World Bank , *World Bank Open Data*.

Thus, the labour force serves as the basis for this indicator, not the total population, and this is expressed as a percentage of the total labour force using the weighted average aggregation method. This indicator uses data from the International Labour Organisation's "ILO Modelled Estimates and Projections Database", which includes national observations and imputed data for countries missing data, aiming to highlight regional and global trends through regular country coverage, making it an ideal measure of unemployment for this research study.

The unemployment variable was created by downloading the unemployment rate data set from the World Bank World Development Indicators Database, which consisted of 266 observations and 65 variables. These variables included country name, country code, indicator name, indicator code, and annual 'unemployment rate' data covering the period from 1960 to 2022.

The unemployment data set was filtered to only contain data from 2019 and then cleaned to remove unnecessary variables and missing values, strengthening the credibility and accuracy of the findings in the research study. The use of 2019 estimates for the 2019 to 2022 period was based on data availability and consistency, with differences between the observation years and 2019 considered negligible.

3.7 Data Methods

As indicated in the previous sections of this chapter, once all the data sets needed were acquired, each data set was imported into R for processing. Each data set contained specific variables related to different aspects of the research study, such as economic and demographic indicators. The initial cleaning of each data set involved renaming variables, removing unnecessary variables and missing values, as well as making any other necessary adjustments to ensure consistency across all data sets included in the research study.

Following the initial cleaning, all nine data sets were merged into a single comprehensive data set. This combined data set initially contained 584 274 observations and 24 variables. The merging process involved consolidating data from different data sets into one unified comprehensive data set using country codes, ensuring

that the variables of each data set were appropriately aligned and combined.

This merged data set of 584 274 observations represented the aggregate of the data points from the original nine data sets. However, some of these observations were duplications or redundant as a result of overlaps between data sets as well as inconsistencies in how the data was organised. Further cleaning was undertaken to identify and remove missing values, to ensure that the analysis would be based on complete data, as well as to eliminate duplicated observations, to prevent skewing of results. Furthermore, any unnecessary variables that were not directly related to the research study's objectives were also removed.

After these additional cleaning steps, the data set consisted of 345 263 observations and 12 variables. These 12 variables included date, country, country code, internet shutdowns, elections, protests, degree of democracy, income group, internet penetration, education, population size, and unemployment.

Following the completion of data collection and preparation, several statistical techniques including univariate distributions, correlation matrices, principal components analyses, multi-item indexes and multiple multivariate logistic regressions were utilised to empirically test how the selected variables relate to each other, which will be discussed further in the following chapter.

3.8 Summary of Variables and Data Sources

TABLE 3.2: Summary of Variables and Data Sources

Variable Name	Variable Type	Data Source
Internet Shutdowns	Dependent Variable	Access Now
Elections	Dependent Variable	Election Guide
Protests	Dependent Variable	ACLED
Internet Shutdowns during Elections	Dependent Variable	Access Now, Election Guide
Internet Shutdowns during Protests	Dependent Variable	Access Now, ACLED
Degree of Democracy	Independent Variable	V-dem
Income Group	Independent Variable	World Bank
Internet Penetration	Independent Variable	World Bank
Education	Independent Variable	World Bank
Population	Control Variable	World Bank
Unemployment	Control Variable	World Bank

3.9 Conclusion

This chapter has discussed the research methodology of this study on the relationship between internet shutdowns during elections or protests and the following four factors: degree of democracy (regime type), income group (GDP per capita), education, and internet penetration. The chapter began with an overview of the study's research design in relation to the regression model, programming software and units of analysis used in the study. The chapter outlined the investigation sample of the study in relation to the criteria for countries in the sample as well as the sample period of 2019 to 2022. The subsequent three sections of the chapter provided a comprehensive overview of how the dependent, independent, and control variables used in the study were conceptualised, selected, and created. Lastly, the chapter discussed the data methods following the data preparation steps of the variables included in the study.

Chapter 4

Results and Analysis

4.1 Introduction

This chapter provides the results of the research study into the factors that influence the implementation of internet shutdowns during elections or protests, examining specifically the degree of democracy, income group, education, internet penetration, population and unemployment. The chapter begins with a univariate analysis discussing summary statistics and data transformations. The following section includes a correlation matrix, an initial logistic regression model and contingency tables in the form of a bivariate analysis. The next section discusses the main results of the logistic regression analysis examining the relationship between internet shutdowns and the various variables, which is then followed by an exploration of two alternative logistic regression models to check the robustness of the findings of initial logistic regression models. The chapter concludes with a summary of the main findings.

4.2 Univariate Analysis

4.2.1 Summary Statistics

Table 4.1 includes the summary statistics for each variable in the study across the 345 263 data observations included in the research study. As indicated by the table, all three components of the dependent variable: internet shutdowns, elections, and protests, were formulated on a binary 0-1 scale. The low mean and quartiles indicate that internet shutdowns and elections are rare occurrences in the data set,

as expected with internet shutdowns being a new emerging phenomenon and elections happening usually once every 4 or 5 years around the world. The high mean and quartiles for the protest variable signify the high occurrence of protests, with most observations indicating the presence of protests.

TABLE 4.1: Summary Statistics of Independent Variables

Variable	Min	1st Qu.	Median	Mean	3rd Qu.	Max
Internet Shutdown	0.0000	0.0000	0.0000	0.0024	0.0000	1.0000
Election	0.0000	0.0000	0.0000	0.0004	0.0000	1.0000
Protest	0.0000	1.0000	1.0000	0.9994	1.0000	1.0000
Degree of Democracy	0.041	0.372	0.708	0.641	0.848	0.915
Income Group	551	4648	10145	23126	33674	112622
Education	57.00	96.34	98.81	95.09	100.49	118.87
Internet Penetration	16.61	67.85	73.98	72.23	89.43	99.65
Population	97625	21803000	59729081	109934102	144406261	328329953
Unemployment	0.100	3.669	4.496	7.283	9.952	25.538

In terms of the four independent variables, the wide variation in the degree of democracy variable indicates the inclusion of countries with both high and low levels of democracy in the dataset, with the mean indicating average levels of democracy overall. The income group variables have a wide range, as indicated by the low minimum and high maximum which suggests significant economic disparity between the countries included in the dataset, with the mean being skewed by the higher income groups. The education variable indicates that the education levels of the countries in the data set are generally high, with a high mean that is close to 100, and the maximum value suggests that some countries in the data set have outstandingly high education levels. The internet penetration variable has a wide variation, with the median and mean indicating that most countries in the data set have moderate to high levels of internet usage.

In terms of the two control variables, the population variable has a wide range, with a high maximum that indicates the inclusion of countries with large populations in the data set, and the mean is significantly higher than the median, suggesting a skew towards larger population sizes. The unemployment variable also indicates

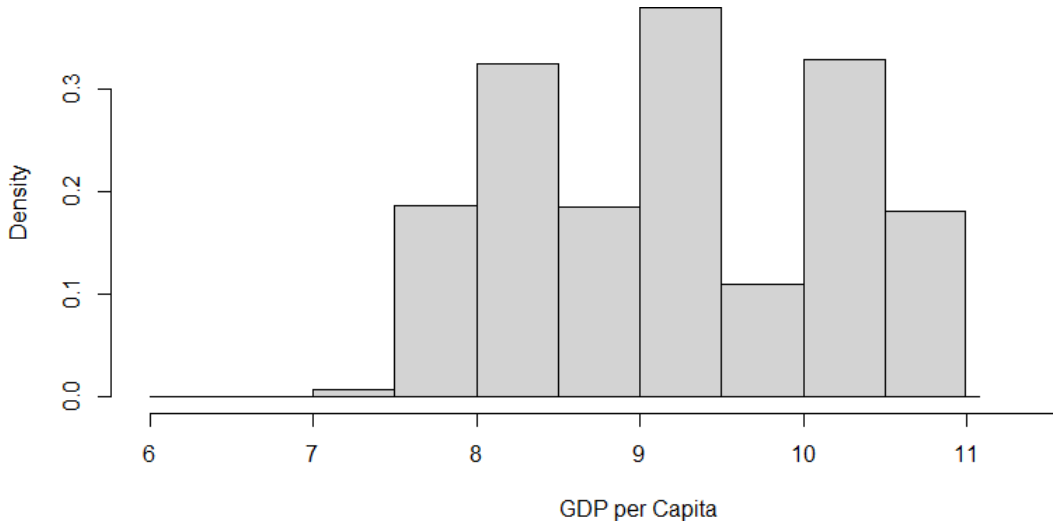
wide variation, with a mean higher than the median, and a high maximum indicating that some countries included in the data set are experiencing extremely high unemployment rates.

4.2.2 Data Transformations

As indicated in the previous section, several variables included in the research study have skewed distributions, which can impact the performance and accuracy of statistical models. Data transformation of the skewed variables is crucial to ensure the robustness of the research study and to reduce multicollinearity.

Given that the three components of the dependent variable are all binary, no data transformation steps were undertaken in the research study.

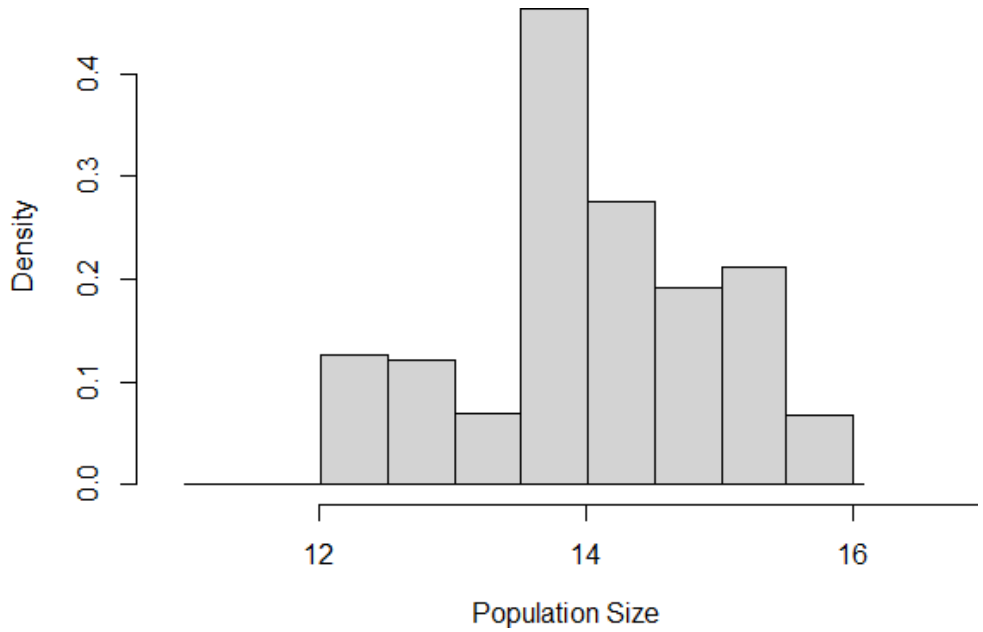
FIGURE 4.1: Histogram of Income Group (log)



In terms of the independent variables, the income group variable of GDP per capita had a wide range and a strongly skewed distribution. The percentage differences in GDP per capita are more theoretically relevant than unit differences, making it a suitable variable for a logarithmic transformation. As shown in the above, the logarithmic transformation of the income group variable has resulted in a more

symmetrical distribution of GDP per Capita.

FIGURE 4.2: Histogram of Population (log)



In terms of the control variables, the population variable had a wide range and strongly skewed distribution. The percentage differences in population size are more theoretically relevant than unit differences are, making it an appropriate variable for a logarithmic transformation. As shown in above figure, the logarithmic transformation of the population variable has resulted in a more symmetrical distribution of population size.

In terms of both the independent and control variables, as indicated by Table 4.2. the following variables were standardised to have a mean of 0 and a standard deviation of 1: internet penetration, education, and unemployment. This standardisation was undertaken to ensure that the coefficients of these variables could be interpreted on a comparable scale.

TABLE 4.2: Updated Summary Statistics of Standardised Variables

Variable	Min	1st Qu.	Median	Mean	3rd Qu.	Max
Std Internet Penetration	-2.61	-0.21	0.08	0.00	0.81	1.29
Internet Penetration	16.61	67.85	73.98	72.23	89.43	99.65
Std Education	-3.52	0.12	0.34	0.00	0.49	2.19
Education	57.00	96.34	98.81	95.09	100.49	118.87
Std Unemployment	-1.25	-0.63	-0.49	0.00	0.47	3.18
Unemployment	0.100	3.669	4.496	7.283	9.952	25.538

4.3 Bivariate Analysis

4.3.1 Correlation Matrix

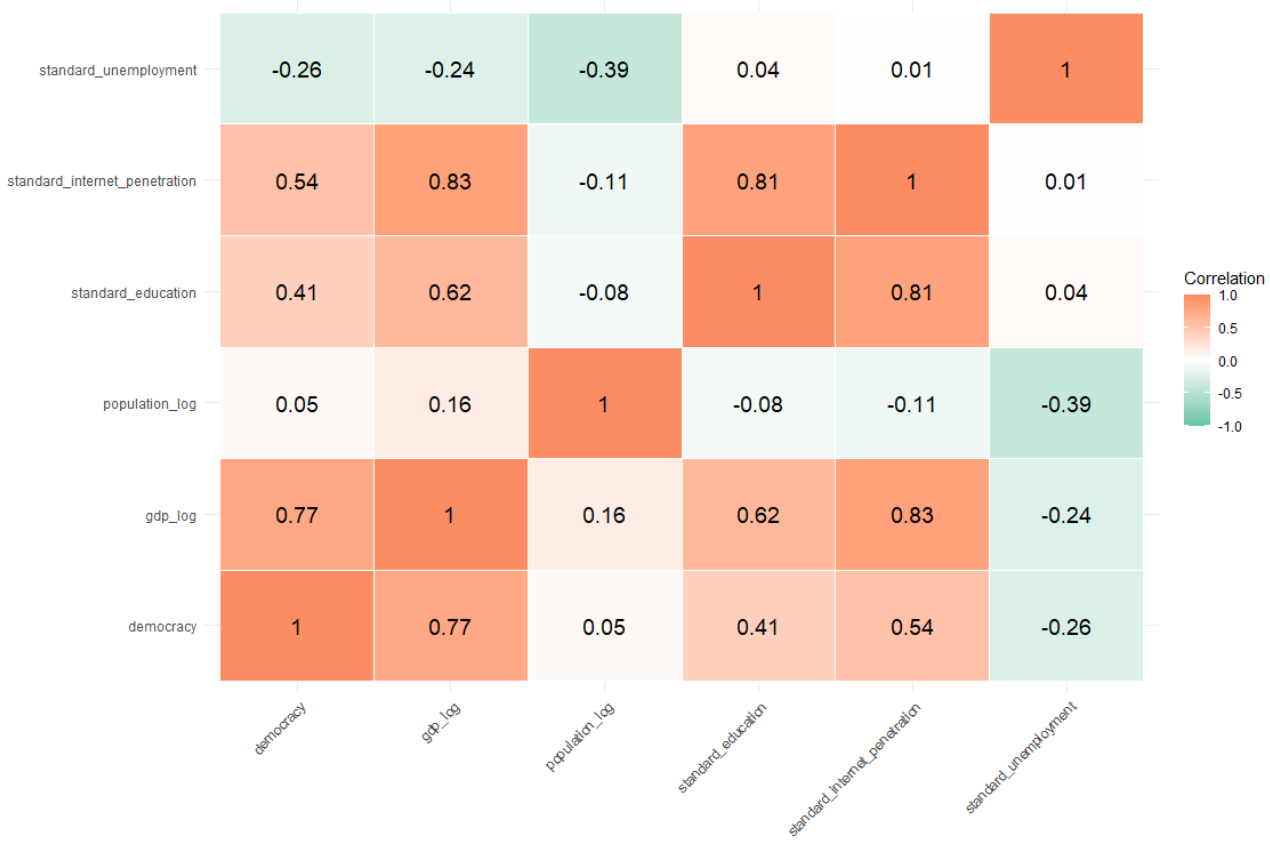
The correlation matrix heatmap indicates several significant insights on the relationship between the independent and control variables used in this research study on the factors that may influence the implementation of internet shutdowns.

As indicated by the correlation matrix heatmap, there are positive correlations between the degree of democracy and income groups, the degree of democracy and internet penetration, income groups and internet penetration, as well as between education and internet penetration.

The strong positive correlation of 0.77 between the degree of democracy and income groups suggests that countries with higher levels of democracy are likely to also have higher income levels. This correlation suggests that democratic frameworks may contribute to economic stability and development. Countries with higher income groups may experience greater economic impact from internet shutdowns, possibly resulting in a government deciding to implement shutdowns less frequently.

The positive correlation of 0.54 between the degree of democracy and internet penetration also suggests that countries with high levels of democracy tend to have higher internet usage. Internet shutdowns in these countries could impact a larger

FIGURE 4.3: Correlation Matrix Heatmap



percentage of the population, possibly leading to greater public outcry and resistance, given that democratic principles often promote unrestricted access to information. Both of these strong correlations highlight the role of democracy in fostering and promoting economic development and digital connectivity.

The strong positive correlation of 0.83 between income groups and internet penetration suggests that countries with higher income levels are likely to have higher internet penetration rates. This suggests that countries with stronger economies, as indicated by higher income levels, are more likely to invest in and develop advanced internet capacity, allowing greater access to online information and digital tools. These countries are also likely to utilise digital services more in relation to digital transactions and e-commerce, making them likely to experience greater economic losses during internet shutdowns.

The strong positive correlation of 0.81 between education and internet penetration indicates that countries with higher education levels tend to have higher internet usage, underscoring the role of education in promoting digital literacy. Countries with higher education levels may also experience more internet disruptions as a result of higher internet usage.

As indicated by the correlation matrix, there are weak correlations between the degree of democracy and population as well as population and education.

The weak positive correlation of 0.05 between the degree of democracy and population suggests that there is not a strong relationship between the degree of democracy and population size in the countries included in this research study, indicating that both large and small populations can have varying levels of democratic governance. This may also indicate that internet shutdowns are implemented in both large and small democracies, with other variables, such as income group having a more influential role in a government's decision to implement a shutdown than population size.

The weak negative correlation of -0.08 between population and education suggests that there is not a strong relationship between the population sizes and education levels of the countries included in this research study, indicating that both large and small populations can have varying levels of education. This may also indicate that internet shutdowns are implemented in both highly educated and less educated populations, with other variables, such as degree of democracy, playing a more influential role in a government's decision to implement a shutdown than education levels.

As indicated by the correlation heatmap, there are negative correlations between population and unemployment as well as democracy and unemployment.

The negative correlation of -0.26 between the degree of democracy and unemployment suggests that countries with higher democracy levels tend to have lower unemployment rates, indicating that democratic governance may result in greater economic stability and employment opportunities. Governments in countries with

higher democracy levels and lower unemployment rates may struggle to justify implementing internet shutdowns in light of its detrimental economic impact as well as internet restrictions being increasingly perceived as authoritarian or undemocratic.

The negative correlation of -0.39 between population and unemployment suggests that countries with larger populations are also likely to have lower unemployment rates. Governments in countries with larger populations and lower unemployment rates may experience significant backlash over internet disruptions as strong labour markets are likely to face greater economic repercussions, possibly leading to governments being more cautious or hesitant to implement a shutdown.

4.3.2 Formulation of Dependent Variable

Internet shutdowns during elections

As mentioned in Chapter 3, the election data set and internet shutdown data set were merged into a single data set using country code to create a data set reflecting internet shutdowns and elections. A dummy variable of internet shutdowns during an election was created, that ranges from 0 to 1, in which 0 represents the non-occurrence of a shutdown during an election and 1 represents the occurrence of an internet shutdown during an election.

As indicated in Table 4.3, which is a contingency table showing the relationship between the occurrence of elections and internet shutdowns, there were 789 instances in the data set where an internet shutdown occurred but there was no election. There were 268 times in the date set where an election occurred but there was no internet shutdown. There were 56 times in the data set when an internet shutdown occurred during an election.

TABLE 4.3: Contingency Table on Internet Shutdowns and Elections

	No Shutdown	**Shutdown**
No Election	0	789
Election	268	56

Table 4.3 indicates that internet shutdowns are more likely to occur during the non-occurrence of an election than during an election. This suggests a weak correlation between internet shutdowns during elections in comparison to internet shutdowns during other events such as protests. The majority of elections did not result in internet shutdowns either, however, there is a small but notable correlation of internet shutdowns during elections, raising questions about the specific circumstances that lead to this. Thus, these findings suggest the need for further investigation into the factors that influence a government's decision to shut down the internet during an election which will be explored in the following section.

Internet shutdowns during protests

As mentioned in Chapter 3, the protest data set and internet shutdown data set were merged into a single data set using country code to create a data set reflecting internet shutdowns and protests. A dummy variable of internet shutdowns during protests was created, that ranges from 0 to 1, in which 0 represents the non-occurrence of a shutdown during a protest and 1 represents the occurrence of an internet shutdown during a protest.

As indicated in Table 4.4, which is a contingency table showing the relationship between the occurrence of protests and internet shutdowns, there were 56 times in the data set where an internet shutdown occurred but there was no protest. There were 344253 instances in the data set where a protest occurred but there was no internet shutdown. There were 789 times in the data set when an internet shutdown occurred during a protest.

TABLE 4.4: Contingency Table on Internet Shutdowns and Protests

	No Shutdown	**Shutdown**
No Protest	0	56
Protest	344253	789

Table 4.4 indicates that internet shutdowns are more likely to occur during a protest than during the non-occurrence of a protest. This suggests a strong correlation between protests and a government's decision to implement a shutdown. However,

the majority of occurrences of protests did not lead to a shutdown, which suggests that while there is a correlation between internet shutdowns and protests, internet shutdowns are not implemented primarily as a result of a protest. These findings raise questions on the factors that influence a government's decision to shut down the internet during a protest which will be examined in the following section.

Regression Model of Internet Shutdowns

	Dependent variable:
	Model of Internet Shutdowns, 2019-2022
Protests	-22.405
	(281.129)
Elections	-32.374
	(324.459)
Democracy	-5.008***
	(0.345)
Internet Penetration	0.026***
	(0.004)
Unemployment	-0.077***
	(0.010)
Income Group (log)	-1.203***
	(0.106)
Population (log)	0.305***
	(0.043)
Constant	22.410
	(281.130)
Observations	345,263
Log Likelihood	-4,684.274
Akaike Inf. Crit.	9,384.549
Note:	*p<0.1; **p<0.05; ***p<0.01

TABLE 4.5: Internet Shutdowns Effects Decomposition Table

Prior to the formulation of the dependent variables of internet shutdowns during elections and internet shutdowns during protests, an initial logistic regression model assessing the likelihood of internet shutdowns in relation to the occurrence of elections and protests was conducted.

The protest variable had a 22.40 negative association with internet shutdowns, which was not found to be statistically significant. This lack of significance suggests that while shutdowns do occur during a protest as indicated by Table 4.4, the occurrence of a protest alone does not have a strong impact on a government's decision to implement a shutdown. This finding raises questions on which factors may have a strong influence on a government's decision to implement a shutdown during a protest.

Similarly, the election variable had a 32.37 negative association with internet shutdowns, which was also not found as statistically significant. This lack of significance suggests that while shutdowns do occur during elections as indicated by Table 4.3, the occurrence of an election alone does not drive a government's decision to implement a shutdown. This finding raises questions on what factors may influence a government's decision to implement a shutdown during an election.

This model indicates that while protests and elections are commonly assumed to be catalysts for internet shutdowns as a result of the occurrence of shutdowns during elections and protests, the occurrence of these events alone may not have a significant impact on the likelihood of a shutdown. This finding highlights the complex interplay of the factors influencing internet shutdowns, as while these events are often associated with internet shutdowns, a government's decision to implement a shutdown during an election or protest may be contingent on additional factors.

In this model, democracy (-5.01), internet penetration (0.03), unemployment (-0.08), income group (-1.20) and population size (0.31) are all found to have significant associations with the likelihood of internet shutdowns.

The findings of this logistic regression model challenge the assumption that elections and protests are the primary triggers for internet shutdowns, highlighting the

importance of other underlying factors. These findings raise questions on the factors that drive a government's decision to shut down the internet during an election or protest, which will be examined in the following section.

4.4 Main Results

4.4.1 General Overview

This section reflects on the main results of the research study. The section discusses the results of the two logistic regression models on internet shutdowns, in which one focuses on internet shutdowns during elections and the other focuses on internet shutdowns during protests. Both regression models include two control variables, which are unemployment and population, and four independent variables, which are the degree of democracy, income group, education and internet penetration. The section also includes two alternative logistic regression models that use a different measure of democracy as robustness checks.

4.4.2 Regression Model 1: Internet Shutdowns during Elections

In assessing the impact of the degree of democracy on internet shutdowns during elections, a bivariate logistic linear regression estimates that the degree of democracy has a 9.71 total negative association with internet shutdowns during elections. These findings indicate that there is a significant negative effect between the degree of democracy and internet shutdowns, suggesting that democracy plays a critical role in a government's decision to block internet access during elections. Countries with lower levels of democracy are more likely to have internet shutdowns during elections and countries with higher levels of democracy are less likely to experience internet shutdowns during elections. While this bivariate regression model provides valuable insights into the relationship between democracy and internet shutdowns, it's important to consider additional variables to isolate the effect of democracy, providing a more nuanced understanding of the relationship and ensuring the robustness of the model.

When internet penetration is added as a predictor variable (as a three-variable multiple logistic regression), the coefficient for the degree of democracy remains relatively the same (-9.70), indicating that the effect of democracy on internet shutdowns during elections is robust and not highly confounded by internet penetration. Internet penetration has a 0.05 negative association with internet shutdowns during elections, which suggests that countries with higher internet penetration rates are less likely to experience internet disruptions during elections, and vice versa, countries with lower internet penetration rates may be less likely to experience shutdowns during elections. The internet penetration association with internet shutdowns is small but potentially still relevant to this research study, highlighting the need to consider additional variables to gain a more comprehensive understanding of the factors influencing shutdowns during elections.

When unemployment is added as a control variable (as a four-variable multiple logistic regression), the coefficient for degree of democracy (-9.49) and internet penetration(-0.06) remains relatively the same, with unemployment having a 0.04 positive association with internet shutdowns. The influence of unemployment on internet shutdowns during elections is not statistically significant, as indicated by the high p-value of 0.206. This finding suggests that unemployment does not strongly influence the likelihood of an internet shutdown during elections and highlights the need for additional models that include other socioeconomic variables, instead of unemployment, to explain the complex nature of internet shutdowns during elections.

When education is added as a predictor variable (as a four-variable multiple logistic regression) instead of unemployment, the coefficient for degree of democracy (-9.82) and internet penetration (-0.06) remains relatively the same, with education having a 0.02 positive association with shutdowns. The influence of education on internet shutdowns during elections is not significant at the 5% level with a p-value of 0.095. This finding suggests that while education may play a minor role, it is not as influential as democracy or internet penetration in affecting the likelihood of shutdowns during elections. Education is marginally significant at the 10% level, indicating the need for further research to confirm if the relationship between education and internet shutdowns is consistent across different models and variables.

	Dependent variable:					
	Internet Shutdowns during Elections, 2019-2022					
	(1)	(2)	(3)	(4)	(5)	(6)
Degree of democracy	-9.714***	-9.703***	-9.487***	-9.819***	-9.057***	-6.779***
	(0.662)	(0.716)	(0.731)	(0.722)	(0.783)	(0.842)
Internet Penetration		-0.054***	-0.056***	-0.062***	-0.040***	0.005
		(0.008)	(0.008)	(0.010)	(0.013)	(0.016)
Unemployment			0.047			
			(0.037)			
Education				0.022*	0.032**	0.003
				(0.013)	(0.014)	(0.016)
Income Group (log)					-0.763**	-1.035***
					(0.314)	(0.337)
Population (log)						0.892***
						(0.123)
Constant	6.242***	9.385***	9.164***	7.892***	11.762***	-2.487
	(0.370)	(0.746)	(0.767)	(1.121)	(1.963)	(2.562)
Observations	324	324	324	324	324	324
Log Likelihood	-263.742	-229.907	-229.111	-228.494	-225.353	-193.742
Akaike Inf. Crit.	531.485	465.813	466.223	464.988	460.707	399.484
Note:						*p<0.1; **p<0.05; ***p<0.01

TABLE 4.6: Election-Shutdowns Effects Decomposition Table

When income group is added as a predictor variable (as a five-variable multiple logistic regression), the coefficient for the degree of democracy decreases slightly from -9.82 to -9.06, remaining strongly significant. This finding indicates that both democracy and economic conditions play crucial roles in influencing internet shut-downs during elections. The coefficient for internet penetration decreases from -0.06 to -0.04, becoming less significant. The coefficient for education increases from 0.02 to 0.03, becoming statistically significant (unlike the previous model in which

education was marginally significant). Lastly, income group has a significant negative association of -0.76 with internet shutdowns, indicating that countries with higher income levels are less likely to experience internet shutdowns during elections. Conversely, countries with lower income levels are more likely to experience internet shutdowns during elections.

When population is added as a control variable (as a six-variable multiple logistic regression), the coefficient for the degree of democracy decreases from -9.06 to -6.78 but remains significant. This highlights the strong and consistently significant negative relationship between democracy and internet shutdowns, indicating the crucial role democracy plays in influencing the implementation of internet shutdowns. The coefficient for internet penetration decreased from -0.4 to 0.004, becoming insignificant, indicating that its influence on internet shutdowns is no longer relevant when population is considered. The coefficient for education also decreased from 0.03 to 0.003, becoming insignificant. The coefficient for income group becomes stronger, decreasing from -0.76 to -1.03 and remaining statistically significant, indicating a consistent negative association between income group and internet shutdowns during elections. Lastly, population has a 0.89 positive association with internet shutdowns. This statistically significant association suggests that countries with larger populations are more likely to experience internet disruptions during elections and smaller populations are less likely to experience internet disruptions during elections.

4.4.3 Regression Model 2: Internet Shutdowns during Protests

In assessing the impact of the degree of democracy on internet shutdowns during protests, a bivariate logistic regression estimates that the degree of democracy has a 6.50 total negative association with internet shutdowns during protests. These findings indicate that there is a significant negative effect between the degree of democracy and internet shutdowns, suggesting that democracy plays a critical role in a government's decision to block internet access during protests. Countries with lower levels of democracy are more likely to have internet shutdowns during protests and countries with higher levels of democracy are less likely to experience internet shutdowns during protests. While this bivariate regression model

	Dependent variable:					
	Internet Shutdowns during protests, 2019-2022					
	(1)	(2)	(3)	(4)	(5)	(6)
Degree of democracy	-6.504***	-7.067***	-7.416***	-7.452***	-5.583***	-4.707***
	(0.218)	(0.278)	(0.270)	(0.273)	(0.315)	(0.328)
Internet Penetration		-0.018***	-0.014***	-0.021***	0.017***	0.031***
		(0.001)	(0.001)	(0.004)	(0.005)	(0.004)
Unemployment			-0.054***	-0.053***	-0.082***	-0.078***
			(0.007)	(0.007)	(0.008)	(0.010)
Education				0.012*	-0.002	
				(0.007)	(0.007)	
Income Group (log)					-1.028***	-1.329***
					(0.091)	(0.101)
Population (log)						0.312***
						(0.041)
Constant	-2.962***	-1.699***	-1.365***	-2.008***	5.084***	0.601
	(0.080)	(0.134)	(0.137)	(0.390)	(0.745)	(0.824)
Observations	345,042	345,042	345,042	345,042	345,042	345,042
Log Likelihood	-5,173.699	-5,084.409	-5,050.028	-5,048.539	-4,989.303	-4,956.777
Akaike Inf. Crit.	10,351.400	10,174.820	10,108.060	10,107.080	9,990.605	9,925.553
Note:						*p<0.1; **p<0.05; ***p<0.01

TABLE 4.7: Protest-Shutdowns Effects Decomposition Table

provides informative insights into the relationship between democracy and internet shutdowns, it's important to consider additional variables to isolate the influence of democracy, providing a more comprehensive understanding of the complex relationship and strengthening the validity of the model.

When internet penetration is added as a predictor variable (as a three-variable multiple logistic regression), the coefficient for the degree of democracy becomes stronger, decreasing from -6.50 to -7.07, and remains statistically significant. Internet penetration has a 0.02 negative association with internet shutdowns during protests, which suggests that countries with higher internet penetration rates are

less likely to experience internet disruptions during protests, and vice versa, countries with lower internet penetration rates may be less likely to experience shutdowns during protests. The internet penetration association with internet shutdowns is small but statistically significant, signifying the need to consider additional relevant variables to gain a more comprehensive understanding of the factors influencing a government's decision to implement a shutdown during a protest.

When unemployment is added as a control variable (as a four-variable multiple logistic regression), the coefficient for the degree of democracy becomes stronger, decreasing from -7.07 to -7.42, and remains statistically significant. This illustrates that the inclusion of unemployment in the model enhances the negative influence of democracy on shutdowns during protests. The coefficient for internet penetration decreases slightly from -0.02 to -0.01 but remains statistically significant. Unemployment has a negative association of 0.05 with internet shutdowns during protests. This small but significant association surprisingly suggests that countries with higher unemployment rates are less likely to experience internet shutdowns during protests, which may be a result of the economic cost of shutdowns exacerbating social unrest. Further research is needed to determine the consistency and strength of unemployment on internet restrictions.

When education is added as a predictor variable (as a five-variable multiple logistic regression), the coefficient for the degree of democracy (-7.45) remains relatively the same, indicating that democracy has a robust negative association with internet shutdown during protests. The coefficient for internet penetration strengthens slightly, from -0.01 to -0.02, highlighting that the influence of internet penetration on internet shutdowns is stronger when education is considered. The coefficient for unemployment (-0.05) remains consistent, continuing to have a small yet significant negative association with internet shutdowns during protests. The addition of the education variable does not significantly change the relationship between internet shutdowns during protests and the existing variables but does provide additional insights into the role of education as a factor in a government's decision to implement a shutdown. Education has a 0.01 positive association with internet shutdowns, which is not significant at the 5% level with a p-value of 0.079 but is

marginally significant at the 10% level. This indicates the need for further investigation to confirm if the relationship between education and internet shutdowns during protests is consistent across different models and variables.

When income group is added as a predictor variable (as a six-variable multiple logistic regression), the coefficient for democracy weakens from -7.45 to -5.58 but remains statistically significant, indicating that countries with higher levels of democracy continue to be less likely to experience internet disruptions during protests. The coefficient for internet penetration changes from a negative association of 0.02 to a positive association of 0.01, remaining statistically significant. This change from a negative to a positive association indicates that the addition of income group into the model suggests that countries with higher internet penetration are more likely to experience internet shutdowns during protests. The coefficient for unemployment strengthens from -0.05 to -0.08, remaining statistically significant and indicating an even stronger association between unemployment and internet shutdowns during protests. The coefficient for education changes from a positive association of 0.01 to a negative association of 0.002. This change from a positive to negative association and continued lack of significance, with a p-value of 0.74, indicates that education does not have a consistent or significant impact on internet shutdowns during protests, and should be excluded from the model. Income group has a 1.03 negative association with internet shutdowns during protests. This significant association suggests that countries with higher income groups are less likely to experience internet shutdowns during protests and vice versa, countries with lower income groups are more likely to experience internet shutdowns during protests.

When population is added as a control variable (as a six-variable multiple logistic regression), the coefficient for the degree of democracy decreases from -5.58 to -4.71 but remains significant. This highlights the robust and consistently significant negative relationship between democracy levels and internet shutdowns, indicting the crucial role democracy plays in influencing the implementation of internet shutdowns during protests. The coefficient for internet penetration increases from 0.01 to 0.03. This significantly stronger positive association indicates that countries with higher internet penetration are more likely to experience internet shutdowns during protests, possibly as a result of greater mobilisation of protests facilitated through

the internet. The coefficient for unemployment (-0.08) remains relatively the same, suggesting that countries with higher unemployment rates are less likely to experience internet disruptions during protests. The association of income groups strengthens from -1.03 to -1.33, remaining statistically significant, indicating that countries with governments in countries lower income groups are more likely to implement internet shutdowns during protests. The addition of population as a control variable has a 0.31 positive association with internet shutdowns. This significant association suggests that countries with larger populations are more likely to experience internet shutdowns during protests and countries with small populations are less likely to experience internet shutdowns during protests.

4.4.4 Robustness Check Regression Models

As a robustness check, two alternative logistic regression models using the Worldwide Governance Indicators of "Voice and Accountability", as an alternative measure of democracy were explored in this research study. By using an alternative measure, this robustness check aims to determine if the results of the initial regression models are consistent when a different measure of democracy is used, strengthening the validity and reliability of the research study findings.

4.4.5 Alternative Regression Model 1: Internet Shutdowns during Elections

The voice and accountability variable had a 6.08 significant negative association with internet shutdowns during protests. Thus, both the voice and accountability variable and the degree of democracy variable (-6.07) indicate a strong negative association between democracy levels and internet shutdowns during elections, suggesting that countries with lower democracy levels are more likely to experience internet disruptions during elections. The association of internet penetration (0.01) and education (0.003) remain relatively the same, with the continued lack of significance suggesting that internet penetration and education do not play a crucial role in a government's decision to implement an internet shutdown during an election. The significant negative association between income group (-0.99) and internet shutdowns is consistent with the initial model, indicating that countries with higher

	Dependent variable:
	Alternative Model of Internet Shutdowns during elections, 2019-2022
Voice and Accountability	-6.078***
	(0.790)
Internet Penetration	0.010
	(0.016)
Education	0.004
	(0.018)
Income Group (log)	-0.996**
	(0.442)
Population (log)	0.915***
	(0.150)
Constant	-4.438
	(3.543)
Observations	640
Log Likelihood	-154.862
Akaike Inf. Crit.	321.723
Note:	*p<0.1; **p<0.05; ***p<0.01

TABLE 4.8: Robust Election-Shutdowns Effects Decomposition Table

income groups are less likely to experience election-related internet restrictions. The strong positive association with population (0.91) remains significant, suggesting that smaller populations are less likely to experience internet disruptions during protests. These alternative model findings are consistent with the findings of the original shutdowns-elections regression model, thus confirming that the findings on the factors influencing a government's decision to implement a shutdown during an election are indeed statistically significant and are not dependent on using V-dem as the degree of democracy measurement.

	Dependent variable:
	Alternative Model of Internet Shutdowns during protests, 2019-2022
Voice and Accountability	-3.606***
	(0.386)
Internet Penetration	0.028***
	(0.006)
Unemployment	-0.108***
	(0.023)
Income Group (log)	-1.365***
	(0.170)
Population (log)	0.124**
	(0.054)
Constant	3.769***
	(1.175)
Observations	273,385
Log Likelihood	-3,077.373
Akaike Inf. Crit.	6,166.746
Note:	*p<0.1; **p<0.05; ***p<0.01

TABLE 4.9: Robust Protests-Shutdowns Effects Decomposition Table

4.4.6 Alternative Regression Model 2: Internet Shutdowns during Protests

The voice and accountability variable had a 3.61 significant negative association with internet shutdowns during protests. Thus, both the voice and accountability variable and the degree of democracy variable (-4.71) indicate a strong negative association between democracy levels and internet shutdowns during protests, suggesting that countries with higher levels of democracy are less likely to experience internet disruptions during protests. The positive association between internet penetration (0.03) and internet shutdowns remains relatively the same, indicating a consistent influence of internet penetration on internet shutdowns. The negative association between unemployment (-0.11) and internet shutdowns becomes stronger, suggesting that higher unemployment rates are strongly associated with

a lower likelihood of internet shutdowns during protests. The coefficient of income group (-1.37) becomes slightly stronger, highlighting the consistently strong association between income groups and internet shutdowns, indicating that countries with governments in countries with lower income groups are more likely to implement internet shutdowns during protests. The positive association with population (0.12) reduces slightly but remains significant, suggesting that larger populations are more likely to experience internet disruptions during protests. These alternative model findings are consistent with the findings of the original shutdowns-protests regression model, thus confirming that the findings on the factors influencing a government's decision to implement a shutdown during a protest are indeed statistically significant and are not dependent on using V-dem as the degree of democracy measurement.

4.5 Conclusion

This chapter presented the main findings of the research study's investigation into the factors that influence a government's decision to implement an internet shutdown in relation to democracy, income group, internet penetration, education, unemployment and population. The overall results confirm the expectations outlined in Chapter 3. There is a strong correlation between the degree of democracy and internet shutdowns during elections and protests. The results suggest that while internet penetration does not have a significant correlation with election-related shutdowns, it does play a role in protest-related shutdowns. Education was not found to be a significant predictor of internet shutdowns during elections or protests. Unemployment did not have a significant impact on election-related shutdowns but did have a significant negative association with protest-related shutdowns. A significant association between income group and population was also discovered for internet shutdowns during elections and protests. These findings underscore the crucial role that political and socioeconomic factors play in influencing a government's decision to implement an internet shutdown during an election or protest. The implications of these results will be explored in the next chapter.

Chapter 5

Discussion and Implications

5.1 Introduction

This chapter discusses the results of the regression models presented in Chapter 4 in relation to the factors that influence a government's decision to implement an internet shutdown during an election or protest. The chapter begins with a summary of the main research findings in relation to the research questions and objectives outlined in Chapter 1. The chapter proceeds to consider the implications of this research study for the existing body of literature on the interplay between technology and democracy, the rise of digital authoritarianism and misinformation, and the phenomenon of internet shutdowns. The chapter concludes with a brief discussion of the implications of the research study's findings for policymakers and researchers.

5.2 Summary of Research Findings

As discussed in Chapter 1, there were two research questions driving the investigation of this research study. The first research question was "To what extent is a government's decision to implement a shutdown influenced by various political and socioeconomic factors?" and the second research question asked, "Does this influence differ depending on if an internet shutdown occurs during an election or a protest?".

The intended research objectives of this study included gaining a comprehensive understanding of the use of internet shutdowns as a tool used by governments

during times of enhanced political pressure, by examining how democracy and development may influence a government's willingness to shut down the internet as well as how a government's decision to shut down the internet during an election may differ from a government's decision to shut down the internet during a protest.

A government's decision to implement an internet shutdown is significantly influenced by a range of political and socioeconomic factors, particularly in relation to democracy, economic development and population size. The study's findings confirm that there is a statistically significant causal relationship between a country's degree of democracy and its likelihood to implement an internet shutdown during an election or protest. This suggests that a government's decision to implement a shutdown is largely influenced by a country's degree of democracy. Countries with lower levels of democracy (typically autocratic regimes) are more likely to have internet shutdowns during elections or protests and countries with higher levels of democracy (typically democratic regimes) are less likely to have internet shutdowns during elections or protests. This indicates how shutdowns can be used as a tool by autocratic regimes to control the flow of information and suppress dissent, particularly during times of intensified political pressure such as elections or protests.

The study's findings also indicate that there is a statistically significant causal relationship between a country's level of economic development and its likelihood to implement an internet shutdown during an election or protest. This indicates that a government's decision to implement a shutdown is significantly influenced by a country's income group. Lower-income countries are more likely to have internet shutdowns during elections or protests, possibly as a result of weaker institutional frameworks and newer political institutions. Higher-income countries, with stronger economic and political institutions, are less likely to have internet shutdowns during elections or protests.

The inclusion of population as a control variable strengthened the robustness of the study's findings, providing a more comprehensive understanding of the factors influencing shutdowns. The research findings also indicate that there is a statistically significant causal relationship between a country's population size and its

likelihood to implement an internet shutdown during an election or protest. This indicates that a government's decision to implement a shutdown is influenced by a country's population size. Countries with larger populations are more likely to experience internet shutdowns during an election or protests, possibly as a result of larger populations having a greater risk of mass mobilisation and resistance, leading to governments resorting to shutdowns more often as a tool to control dissent and unrest.

From all the variables included in the research study, education was found to have the weakest correlation as a predictor of internet shutdowns. The study's findings suggest that education levels are not a substantial factor in a government's decision to implement an internet shutdown during an election or protest.

In terms of the second research question on possible differences between internet shutdowns during elections and internet shutdowns during protests, the research study findings found similarities in the influence of degree of democracy, income groups, population size and education on election-related shutdowns and protest-related shutdowns. The research study also found significant differences between the influence of internet penetration and unemployment on election-related shutdowns and protest-related shutdowns.

Internet penetration was not found to have a significant impact on a government's decision to implement a shutdown during an election. However, the study's findings did indicate a statistically significant causal relationship between a country's internet penetration and its likelihood of implementing an internet shutdown during a protest. This indicates that a government's decision to implement a shutdown during a protest is influenced by a country's internet penetration. Countries with higher levels of internet penetration are more likely to experience internet disruptions during a protest, as strong internet connectivity allows for rapid 'real-time' mobilisation and coordination between protestors, leading to governments evoking internet restrictions to limit the spread of information.

Unemployment was included as a control variable in the study to examine its potential influence on the implementation of internet shutdowns, enhancing the study's

robustness by offering a more comprehensive analysis. Unemployment was not found to have a significant impact on a government's decision to implement a shutdown during an election. However, the study's findings did indicate a statistically significant causal relationship between a country's unemployment and its likelihood to implement an internet shutdown during a protest. This indicates that a government's decision to implement a shutdown during a protest is influenced by a country's unemployment levels. Surprisingly, countries with higher unemployment rates are less likely to experience internet disruptions during protests and countries with lower unemployment levels are more likely to experience internet disruptions during protests. This finding suggests that governments in countries with higher unemployment may perceive the economic impact of internet shutdowns as too detrimental towards existing economic distress and social unrest, which tends to already be heightened during protests. As a result, these government may be more hesitant to utilise shutdowns as a tool to control protests, recognising that it could escalate existing economic and social tensions. The findings of this study contribute to the existing literature on internet shutdowns, digital authoritarianism and democracy, which will be discussed further in the next section.

5.3 Implications for Existing Body of Literature

As outlined in Chapter 2, there is an increasing volume of studies focusing on internet control, online censorship and internet shutdowns. However, existing literature on internet shutdowns during elections or protests is scarce, despite the rapid acceleration in such shutdowns. Internet shutdowns during elections and protests are detrimental to democracy and signify a dangerous disregard for human rights and the principles of good governance.

The research study's findings on the causal relationship between degree of democracy and internet shutdowns during elections and protests is significant in the context of rising digital authoritarianism, as it suggests that internet shutdowns will continue to increase as democracy decreases. It also provides further insight into the development of censorship amidst the evolution of the internet and the internet's initial classification as a 'tool of liberation'. Rising digital authoritarianism

amidst the occurrence of internet shutdowns signifies a shift in the way governments control information and limit resistance, in order to maintain and ensure political power, highlighting how internet access is being increasingly weaponised. Furthermore, these findings support the classification of internet shutdowns, both as a unique phenomenon and as an 'anti-democratic' practice that is more closely linked to human rights violations and threats to democracy than other forms of internet control and censorship.

The central assumption of this research study is that states are rational actors, whose actions and interests revolve around maximising their chances of political survival and maintaining power. These findings indicate that governments in countries with lower levels of democracy will be more willing to violate the principles of democracy, in order to achieve their own political desires. Ultimately, these findings contribute to the scarce but increasingly significant literature on internet shutdowns during elections and protests, as well as the existing body of research on the rise of digital authoritarianism. By highlighting the factors behind a government's decision to implement a shutdown, this research study offers valuable insights for policymakers on digital governance and democracy, which will be explored further in the following section.

5.4 Implications for Policymakers

The findings from this research study highlight the complex interplay between political and socioeconomic factors in influencing a government's decision to implement internet shutdowns. It is crucial for policymakers to understand that while shutdowns are an emerging new phenomenon, shutdowns are not unexplainable or unpredictable. Shutdowns are driven by a country's degree of democracy, economic development, population size, internet penetration, and unemployment rates. Understanding the drivers of internet shutdowns is key to the development of comprehensive policies and regulations to prevent shutdowns and mitigate their impacts.

The research study's findings on the significant correlation between the degree of

democracy and the likelihood of internet shutdowns highlight a need for international and national policies that are aimed at strengthening democratic institutions and promoting principles of democratic governance through transparency and accountability. The research study's findings on the economic implications of internet shutdowns, particularly in relation to unemployment rates and levels of economic development, also highlight the need for policies that promote economic growth and development through the advancement of digital public infrastructure and overall digital transformation.

The study's findings on the correlation between internet penetration and protest-related shutdowns indicate that policymakers need to promote digital literacy and the protection of digital rights, ensuring that citizens are able to access and use the internet freely. Lastly, in light of the increasing use of internet shutdowns as a tool of digital authoritarianism, it is crucial for international institutions, human rights organisations and democratic governments to coordinate and cooperate with each other to develop safeguards and frameworks against digital authoritarianism. These efforts are vital for ensuring that the internet remains a tool for liberation instead of oppression.

5.5 Conclusion

This chapter outlined the main implications of the research findings presented in Chapter 4 of this research study into the factors that influence a government's decision to implement an internet shutdown during an election or protest. The chapter began by providing a summary of the main research findings in relation to the research questions and objectives set out at the beginning of this study. The chapter proceeded to discuss the implications of this research study for the existing body of literature on the interplay between technology and democracy, the rise of digital authoritarianism and misinformation, and the phenomenon of internet shutdowns. The chapter concluded with a brief discussion of the implications of the research study's findings for policymakers and researchers.

Chapter 6

Conclusion

6.1 Conclusion

This research study aimed to determine the factors that influence a government's decision to implement an internet shutdown during an election or protests, particularly in relation to democracy, economic development, population size, internet penetration, education and unemployment. The relationship between internet shutdowns and these various factors was measured using 345 263 observations across 171 countries during the period of 2019 to 2022. The study found that democracy, economic development and population size play a significant role in influencing a government's decision to implement an internet shutdown during an election or protest.

This report began by outlining the purpose and significance of the research study, emphasising the need to investigate the factors that influence a government's decision to impose internet shutdowns during periods of heightened political pressure, such as elections and protests. Chapter 1 established the foundation for the study through its research questions and objectives, contextualising the emergence of shutdowns in the broader context of digital authoritarianism and democracy. The opening chapter also discussed the limitations and ethical considerations related to the research study.

The second chapter established the theoretical framework of the study through a comprehensive literature review. Chapter 2 provided an overview of the body of existing research related to the complex relationship between technology and democracy, the rise of digital authoritarianism and misinformation, and the phenomenon

of internet shutdowns during elections and protests, particularly in relation to technological capacity and economic impact. The chapter identified a notable gap in the existing literature on understanding the factors influencing decisions to implement shutdowns, particularly during elections and protests. This study aims to fill this gap by identifying and analysing the impact of these factors, considering how democracy, income group, and other variables might affect the likelihood of a shutdown, enabling insight into the broader implications of internet shutdowns for freedom of expression and democracy.

Chapter 3 provided a comprehensive account of the research methodology used to investigate the factors influencing internet shutdowns during elections and protests. The chapter discussed the quantitative research design of the study, including the use of multivariate logistic regression models. The chapter also discussed the investigation's sample size, units of analysis and sample period as well as the data collection and data preparation steps undertaken. Chapter 3 also provided an in-depth overview of the conceptualisation, selection, and development of all the dependent, independent, and control variables included in the study.

Chapter 4 presented the statistical findings of the research study, through a univariate analysis, bivariate analysis and logistic regression models. The findings highlighted the crucial role that political and socioeconomic factors play in influencing a government's decision to implement internet shutdowns during elections and protests. The results indicated that democracy levels, income groups and population size have a significant influence on a government's decision to implement a shutdown during an election or protest. The findings also suggested that internet penetration is not significantly linked to election-related shutdowns, but it plays a role in shutdowns related to protests. Education did not emerge as a significant predictor of internet shutdowns during either elections or protests. Unemployment did not have a significant impact on shutdowns during elections, though it was surprisingly significantly negatively associated with shutdowns during protests. As a robustness check, the study included two alternative logistic regression models using an alternative measure of democracy. The findings of these robustness check regression models were consistent with the findings of the original regression models, strengthening the validity and reliability of the research study's findings.

Chapter 5 discussed the implications of the research study findings that were presented in the previous chapter. It began by outlining the key findings in relation to the research questions and objectives of the study. Lower democracy levels and economic development increase the likelihood of shutdowns, as governments use shutdowns as a tool to control dissent and manage political pressure. Higher levels of internet penetration and unemployment impact shutdowns differently during protests versus elections, with internet penetration significantly influencing protest-related shutdowns and unemployment showing an unexpected inverse relationship. The chapter then discussed the implications of the study's findings for the existing body of literature. The research findings highlight the correlation between the rise of digital authoritarianism and the increased occurrence of internet shutdowns in countries with lower levels of democracy, indicating a theoretical shift in the perception of the internet from a tool of liberation to a weapon of control. Lastly, the chapter explored the implications of the study's findings for policymakers, emphasising the importance of strengthening democratic institutions, promoting economic development, and safeguarding digital rights in order to prevent and mitigate the impacts of internet shutdowns.

These findings will contribute to the scarce but increasingly significant literature on internet shutdowns during elections and protests as well as the existing body of research on the rise of digital authoritarianism. Furthermore, these findings will contribute to our knowledge about a government's decision-making process in relation to its desire for political survival.

6.2 Suggestions for Future Studies

This research report concludes with suggestions for future studies related to the increasingly significant phenomenon of internet shutdowns, digital authoritarianism and democracy.

This research study could be expanded to delve deeper into the complex dynamics of internet shutdowns, exploring additional variables and contexts to facilitate a more comprehensive understanding. Investigating the long-term socioeconomic

consequences of internet shutdowns over the next decade on both national and local levels as well as different sectors of society could also offer a more nuanced perspective on the impact and complexity of shutdowns. Further possible future works could include analysing if the type of elections (parliamentary or presidential) influences a government's decision to shut down the internet during an election as well as if the type of protest (non-violent or riot) influences a government's decision to shut down the internet during a protest. Future studies could also explore geographical determinants of internet shutdowns, such as whether governments in certain regions are more likely to implement shutdowns, the role of civil society strength within a country, and the influence of the incumbent's likelihood of winning an election on the decision to implement a shutdown.

Another possible area of related future work would be examining if the implementation of the type of shutdown (a partial shutdown which is commonly referred to as "throttling" or a full shutdown which is known as a "kill-switch shutdown) significantly differs between different regime types. It could also be insightful to explore the role of non-state actors in internet control and censorship, as this could be important in the future given the increasing role of non-state actors in the international system. Furthermore, in light of the research study's findings on democracy and digital authoritarianism, future areas of work could also be related to the field of digital governance, through the development of frameworks and regulations on the implementation of internet shutdowns as well as the protection and promotion of digital rights.

Future research could also critically analyse if a government's control over the internet is always inherently negative or undemocratic and explore scenarios where certain forms of internet regulation may be justified. Further investigation into the complex relationship between state involvement in the internet and the roles played by big technology platforms could also provide a more balanced perspective on the dynamics of power and accountability in the digital realm, providing further insight into state motivations and actions.

Bibliography

Access Now, *#KeepItOn STOP Data 2016-2022 [Public]*, 2023. Accessed July 10, 2023.

———. *KeepItOn: Fighting Internet Shutdowns around the World*. Accessed July 10, 2023.

ACLED, *ACLED Data: Bringing Clarity to Crisis*. Accessed July 10, 2023.

Alhindi, Waheed, Muhammad Talha, and Ghazali Sulong. "The Role of Modern Technology in Arab Spring." *Archives des sciences 1661-464X* 65 (September 2012): 1661–464.

Bhatia, Kiran Vinod, Mariam Elhussein, Ben Kreimer, and Trevor Snapp. "Protests, Internet Shutdowns, and Disinformation in a Transitioning State." *Media, Culture & Society*, February 2023, 016344372311555. ISSN: 0163-4437, 1460-3675, accessed July 10, 2023. https://doi.org/10.1177/01634437231155568.

Creswell, J. W. *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 2013. Accessed July 10, 2023.

Freedom House , *Freedom on the Net 2021 :The Global Drive to Control Big Tech*. Technical report. Freedom House, 2021. Accessed July 10, 2023.

Freyburg, Tina, and Lisa Garbe. "Authoritarian Practices in the Digital Age| Blocking the Bottleneck: Internet Shutdowns and Ownership at Election Times in Sub-Saharan Africa." *International Journal of Communication* 12, no. 0 (2018). ISSN: 1932-8036. https://ijoc.org/index.php/ijoc/article/view/8546.

GPD and Access Now. *Evading Accountability through Internet Shutdowns: Trends in Africa and the Middle East*. Technical report. Global Partners Digital and Access Now. Accessed July 10, 2023.

Halliday, J. *"UAE to tighten Blackberry restrictions"*. The Guardian. Accessed May 18, 2023.

IFES, *IFES Election Guide*, 2023. Accessed July 10, 2023.

Keremoğ lu, Eda, and Nils Weidmann. "How Dictators Control the Internet: A Review Essay." *Comparative Political Studies* 53 (March 2020): 001041402091227. https://doi.org/10.1177/0010414020912278.

Koerner, Kevin, and Kevin Körner. "Digital Politics: AI, Big Data and the Future of Democracy." *Deutsche Bank Research*, 2019.

Mukeredzi, Tonderayi. "Uproar Over Internet Shutdowns: Governments Cite Incitements to Violence, Exam Cheating and Hate Speech," 2017.

Muthayan, Nerissa. *"Internet Shutdowns Threaten Democracy in World's Biggest Voting Year"*. South African Institute of International Affairs. Accessed August 10, 2024.

Rajat, Kathuria, Mansi Kedia, Gangesh Varma, Kaushambi Bagchi, and Richa Sekhani. "The Anatomy of an Internet Blackout: Measuring the Economic Impact of Internet Shutdowns in India." Accessed July 10, 2023.

Rydzak, Jan. "The Digital Dilemma in War and Peace: The Determinants of Digital Network Shutdown in Non-Democracies." March 2016.

Ryng, Julia, Guillemette Guicherd, Judy Al Saman, Priyanka Choudhury, and Angharad Kellett. "Internet Shutdowns: A Human Rights Issue." *The RUSI Journal* 167, nos. 4-5 (July 2022): 50–63. Accessed May 29, 2023.

Samuel Woodhams, Simon Migliano. *"Government Internet Shutdowns Have Cost $ 53 Billion Since 2019"*. TOP10VPN. Accessed March 21, 2024.

Theodora S, Maya Vishwanath, Rehan M. *"Digital Disruption: Measuring the Social and Economic Costs of Internet Shutdowns Throttling of Access to Twitter"*. Tech Policy Press. Accessed March 21, 2024.

UNHCR, *A/HRC/50/55: Internet Shutdowns: Trends, Causes, Legal Implications and Impacts on a Range of Human Rights - Report of the Office of the United Nations High Commissioner for Human Rights*. Accessed July 10, 2023.

V-Dem. *The V-Dem Dataset – V-Dem*, 2023. Accessed July 10, 2023.

Vargas-Leon, Patricia. "Tracking Internet Shutdown Practices: Democracies and Hybrid Regimes," 167–188. January 2016. ISBN: 978-1-349-57846-7. https://doi.org/10.1057/9781137483591_9.

Wagner, Ben. "Understanding Internet Shutdowns: A Case Study from Pakistan," 2018.

Watch, Human Rights, and Internet Freedom Foundation. *"No Internet Means No Work, No Pay, No Food: Internet Shutdowns Deny Access to Basic Rights in "Digital India"*. Human Rights Watch. Accessed August 21, 2023.

Wilson, Steven Lloyd. "How to control the Internet: Comparative political implications of the Internet's engineering." *First Monday* 20, no. 2 (January 2015). https://doi.org/10.5210/fm.v20i2.5228. https://firstmonday.org/ojs/index.php/fm/article/view/5228.

World Bank , *World Bank Open Data*. Accessed July 10, 2023.