



Effects of network disruptions on health service delivery among private practicing physicians in Bulawayo Metropolitan Province, Zimbabwe

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DEFENDING THE INTERNET

WITH DATA

Abstract

Background: The Ministry of Health and Child Care (MoHCC) in partnership with the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) and the Telecommunications Union (ITU) under the E-health strategy have started implementing the telemedicine project. The TELEMEDICINE PROJECT is meant to promote health information dissemination for interaction and collaboration among institutions, health professionals, health providers and patients. The TELEMEDICINE PROJECT further seeks to reduce the physical pressure exerted by the growing population of patients on health care delivery systems by promoting the use of technology which may limit physical visit to health care institutions by patients. Private Practicing Physicians (PPPs) in Bulawayo have also joined the wagon of telemedicine and electronic health records (EHR) in providing health care services to their patients. For example, in a bid to foster a fluid health information sharing system, PPPs have started using social media platforms as avenues of communication with their patients. At the centre of it all is the availability of uninterrupted Internet which is the main vehicle which telemedicine services are hinged on. Furthermore, patients likewise, constantly use the Internet as a source of health information and a channel to communicate with their PPPs. However, these health care processes are in some cases, negatively affected by network disruptions such as insufficient network bandwidth, low Internet speeds and in extreme cases Internet shutdowns. Internet shutdowns have negative effects on how health care services are delivered. It is against this background the study sought to bring to the fore, the impact of network disruptions on healthcare provisions among PPs in the Bulawayo Metropolitan Province.

Purpose: To explore the effects of network disruptions on health care service delivery among selected PPPs in the Bulawayo Metropolitan Province. Furthermore, the research seeks to make recommendations to the MoHCC and other policy makers on some of the best ways of network management within the health services.

Methodology: The study used a qualitative research methodology with a survey as the major research design. The population of the study constituted 106 PPPs who were purposefully chosen from the Medical and Dental Practitioners Council of Zimbabwe, (MDPCZ) (2021) register based on their Bulawayo addresses. The study further conveniently selected 2 patients per physicians' rooms, therefore bringing the population of the study to 318 participants. A semi structured questionnaire was distributed to 106 PPPs. Another semi-structured questionnaire was distributed to 212 patients.

Results: Patients and PPPs greatly rely on the Internet in seeking and delivering health care services, respectively. Uses of the Internet include, communication, making online payment of medical bills, online health information seeking, provision of telehealth services and conducting of medical research. The study further establish that patients and PPPs use VPNs in ameliorating Internet shutdowns, however they have little knowledge on the implications of using such tools.

Recommendations: The government of Zimbabwe should effectively consider the effects of Internet shutdowns on health care service delivery and as such avoid the shutting down of



the Internet. There is need for patients and PPPs to invest more time in learning about the implications of using VPNs to have a proper understanding of such tools before they adopt their use.



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Introduction

This research paper sought to explore the effects of network disruptions on health care service delivery among selected PPPs in the Bulawayo Metropolitan Province. Globally there has been an increase in Internet shutdowns (Ayalew, 2019; Rajagopal, 2020). According to the Shutdown Tracker Optimisation Project (STOP) (2016-2018) an Internet shutdown can be described as the intentional disruption of electronic communications or the Internet as a whole subsequently rendering the Internet unusable within a defined location. Data from this report presents at least 196 Internet shutdowns in the year 2018. There were 106 Internet shutdowns in the year 2017 and increase from 75 in 2016 and (STOP, 2016-2018). Despite the official justifications of Internet shutdown presented by governments such as political instability, public safety, national security, fake news, hate speech and third-party actions among other justifications, the effects of Internet shutdowns are often not documented, and literature tells us they likely have more disadvantages than advantages (Wagner, 2018; Chutel, 2019; Mare, 2020). This is especially true within health delivery systems that employ telehealth services (Mbah, Nkangu and Rogoff, 2018; De Gregorio and Stremlau, 2020). Internet shutdowns negatively disrupts the manner in which health care information flows from one service provider to another or from a service provider to patients (Mbah, Nkangu and Rogoff, 2018; De Gregorio and Stremlau, 2020).

Objectives

1. To explore the use of Internet in the delivery of health care services by PPPs and patients in the Bulawayo Metropolitan Province.
2. Establish ways in which network disruptions affect health care services among PPPs and patients in the Bulawayo Metropolitan Province.
3. To find out how PPPs and patients circumvent and/or ameliorate the challenges associated with Internet disruptions.
4. To make recommendations on some of the best practices of network management that PPPs and patients can use.

Internet Usage in Zimbabwe

There were an estimated 5.01 million Internet users in Zimbabwe as of January 2021 which was an increase of 223 thousand (+1.5%) between January 2020 and January 2021 (Kemp, 2021). Kemp, (2021) further highlights that Zimbabwe had 14.76 million mobile connections in January 2021, which is 98.5% of the total population in Zimbabwe. Zimbabweans use the Internet for various reasons such as online payments, educational purposes, entertainment, communication and - of interest to this study - the provision of health care services. It is important to note that some of the aforementioned uses are mostly conducted on social media platforms such as Facebook, WhatsApp, Websites and many more. According to Kemp, (2021) as of January 2021, there were 1.30 million social media users in Zimbabwe which was an increase of 320 thousand (+33%) between 2020 and 2021.

Internet Governance in Zimbabwe

Many governments around the world have increasingly used Internet shutdowns to censor



and control their populations. The Government of Zimbabwe has also deployed intentional Internet disruptions between the years 2016 and 2019 (Chutel, 2019; Marchant and Stremlau, 2019). In July 2016, the Government of Zimbabwe ordered telecommunications companies to specifically shutdown social media platforms such as WhatsApp and Facebook for a maximum of 4 hours (Chutel, 2019; Marchant and Stremlau, 2019; Mare, 2020). A total/blanket Internet shutdown was imposed in January 2019 which saw the country going for a maximum of seven days without the Internet (Mpfu and Mare, 2020). The arguments presented by the Government for shutting down the Internet have been centered on the need to promote public safety, national security, fake news mitigation and cyber bullying control (Mare, 2020). The Zimbabwean Government is a major shareholder in telecommunication companies such as TelOne, and Telecel, while Econet Wireless is privately owned (Table 1)

Company Name	Shareholders and Their Percentages	Market Share %
Econet Wireless Zimbabwe	Econet Global Limited, 42.62% Stanbic Nominees (Private) Limited (NNR), 16.83% Stanbic Nominees (Private) Limited, 9% Other shareholders, 31.55%	69.7
Telecel Zimbabwe	Government, 60% Consortium of local and international investors, 40%	8.9
NetOne	Government, 100%	21.4

Table 1: Mobile Service Providers, Ownership and Market Share, Source: POTRAZ, 2021

Although the Government does not have total control of some of the telecommunication companies such as Econet Wireless which is a major shareholder in Zimbabwe Online (ZOL), and Liquid Telecommunications, it has the power to impose such orders based on what Mpfu and Mare, (2020) call digital authoritarianism and Internet Service Provider (ISP) Ownership within non-democratic states. Although telecommunication services providers are morally obliged to provide un-interrupted Internet services to their clients, they are also legally caught in the cloud of legal obligations to their regulator which in the case of Zimbabwe is the Government (Ayalew, 2019; Chutel, 2019; Marchant and Stremlau, 2019; Mare, 2020). Mare, (2020:4248) argues that “one of the reasons it is difficult for telecommunications to push back against government orders is that certain licensing obligations allow regulators to invoke nebulous justifications, such as the need to protect national security.” For example, all telecommunication companies in Zimbabwe are governed by the Postal and Telecommunications Act of 2000 and the Interception of Communications Act (ICA) of 2007. Section 9 of the ICA gives authority to the Government to monitor and control communication surveillance including the Internet (ICA, 2007). This is despite the Government not owning some of the International Gateway Systems in Zimbabwe (see table 2).



Name	Type of company	Number of gateway systems
Econet Wireless Zimbabwe	Private	1
Telecel	State-Owned	1
Tel-One	State-Owned	1
Net-One	State-Owned	1
Africom	State-Owned (Ministry of Defense is the majority shareholder)	1
Total		5

Table 2: Ownership and Control of International Gateway Systems in Zimbabwe, Source: POTRAZ, 2021

Internet and Healthcare Service Delivery

The Ministry of Health and Child Care (MoHCC) in partnership with the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) and the Telecommunications Union (ITU), under the E- health strategy, have started implementing the TELEMEDICINE PROJECT (Gwarisa, 2018; Furusa and Coleman, 2018; Madziwa, 2018). The TELEMEDICINE PROJECT was initiated to promote health information dissemination for interaction and collaboration among institutions, health professionals, health providers and patients (Gwarisa, 2018; Furusa and Coleman, 2018). This program was considered especially important due to the hierarchical structure of the health care delivery system in Zimbabwe, which largely depends on a fluid uninterrupted flow of health information from one health care institution to another and one physician to another (Khumalo and Mnjama, 2019; Masuku and Ngulube, 2019). For example, the health delivery system is divided into the primary, secondary, tertiary, and quaternary levels (Masuku, 2013; National Health Strategy for Zimbabwe (NHSZ), 2015). The primary health care service delivery provides the basic health care services and in case of complicated medical cases, a patient is further referred up the hierarchy (Madziwa, 2018). As such it is imperative that there exists a fluid health information communication system that promotes effective service delivery throughout those levels of care. The TELEMEDICINE PROJECT has been rolled out against a background of the dilapidating physical health infrastructure which is currently being overwhelmed by the growing population (Ngwenya, 2017; Gwarisa, 2018). Furthermore, some studies have shown that PPPs have also joined in the telehealth wagon by mainly adopting the use of electronic health record (EHRs) systems, use of online communication platforms such as WhatsApp, Emails, and Websites (Madziwa, 2018; Khumalo and Mnjama, 2019). Patients likewise use the Internet for seeking health information tips, communication with PPPs, and even purchasing of health suppliers online (Doyle, Bandason, Dauya, McHugh, Grundy, Dringus, Chikwari and Ferrand, 2021). At the center of it all is the availability of an uninterrupted Internet supply which is the key vehicle in which such health care services are dependent (Doyle et al, 2021). As such, this study was interested in exploring the effects of network disruptions on those health care service delivery with a particular focus on PPPs in the Bulawayo Metropolitan Province.



Private Practicing Physicians in Zimbabwe

The expansion of training capacity of medical doctors across the country has seen an increasing number of physicians in the country (Chinyadza, 2014). Some of these physicians go on to establish private practices specializing in different fields such as anesthesiology, gynecology, plastic and reconstructive surgery, radiography, oncology, neurology, urological, Pediatrics, and Orthopedic services to mention a few (Chinyadza, 2014, Mugwagwa, Chinyadza and Banda, 2017; Madziwa, 2018). According to the Medical and Dental Practitioners Council Zimbabwe (MDPCZ, 2021) website there are 2,949 registered private doctors in Zimbabwe with only 106 registered with a Bulawayo address (MDPCZ, 2021). Some PPPs have adopted telehealth services to serve the growing patient population across the country (Mugwagwa, Chinyadza and Banda, 2017).

Design

The study used a qualitative research methodology with a survey as its major research design. The population of the study constituted of 106 PPPs who were purposefully chosen from the MDPCZ (2021) register based on their Bulawayo addresses. The study further conveniently selected 2 patients per physicians' rooms, therefore bringing the population of the study to 306 participants. A semi structured questionnaire was distributed to 106 PPPs. Another semi-structured questionnaire was distributed to 200 randomly selected patients within the PPPs' rooms. The patients were key in validating the data given by PPPs and most importantly to understand how as key stakeholders in health delivery were affected by Internet shutdowns in Zimbabwe. From the 306 distributed questionnaires the study retained a 100% response rate as all questionnaires were returned.

Results

The following section presents the results of the study as obtained from the study's participants. The results of the study were analysed using SPSS and exported to excel for creating data visualization tools.

Demographic Information

Patient Gender

The data collected from the study showed that there were 117 (58.5%) males and 83 (41.5%) females surveyed. Based on the findings of the study it meant that males were more willing to conduct the study than females. Although it may also be argued that males visit PPPs more than females.



Patient Age

The mode age group was 22 with 13 (6.6%) patients, followed by the age 39 with 12 (6.1%), and the third mode was the age 29 with 11 (5.6%). This showed that patients between the ages of 22 and 39 visited PPPs more than other ages.

Private Practicing Physician’s Speciality

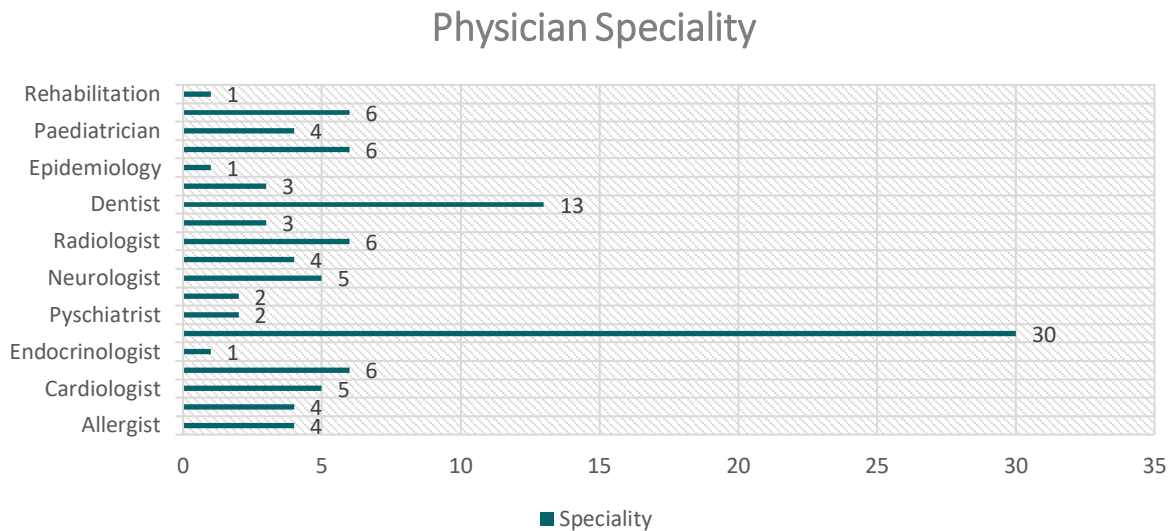
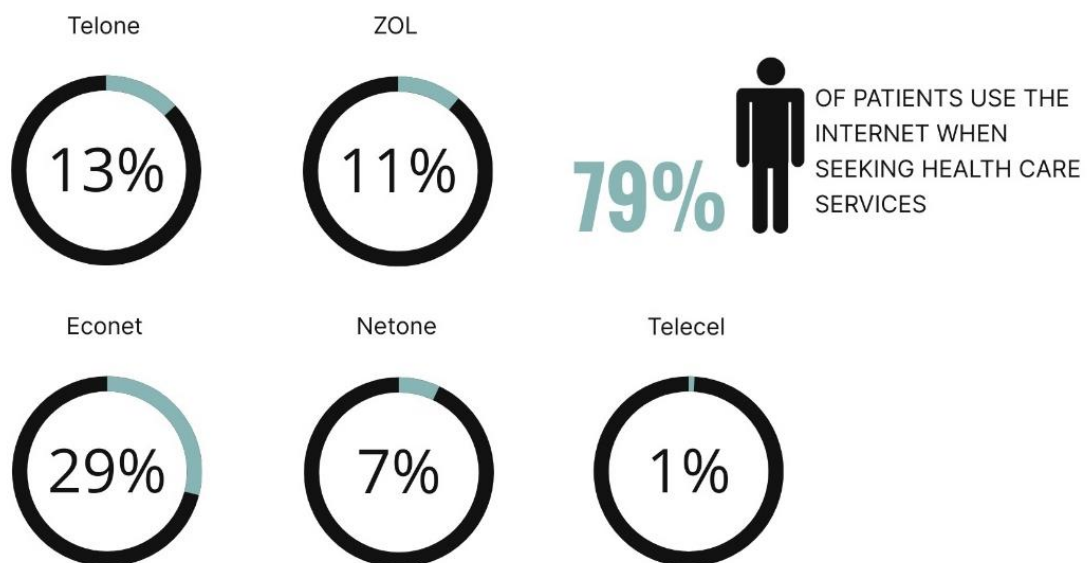


Figure 1: Private practicing physician specialisation

Physicians’ Experience in Years

In this study, 2 (2%) of the PPPs had 36 years working experience which was the highest number of working experiences among the surveyed physicians. Most PPPs 10 (9%) had 6 years working experience. Overall the data shows that most 58 (55%) of the surveyed PPPs had 10 or less years of working experience. This data shows that most of the PPP had experienced the recent Internet shutdowns hence their responses could be trusted based on the experience they had.



The responses gathered from the patients showed that most patients utilise more than one Internet service provider. However, when measured in singulars the study established that 57 (28.5%) patients use Econet as their Internet service provider, followed by Telone with 25 (12.5%) patients. The third most used service provider was ZOL with 21 (10.5%) of subscribers, fourth was Netone with 14 (7%), with the least being Telecel with 2 (1%) of the surveyed subscribers. The high rate of Econet Internet subscribers may be credited to the relatively cheaper mobile data than the rest of the service providers. Further, the data shows that 157 (79%) patients use the Internet to seek health care services while the remaining 43 (21%) do not use the Internet when seeking health care services.

Internet Use by Patients in Seeking Health Services

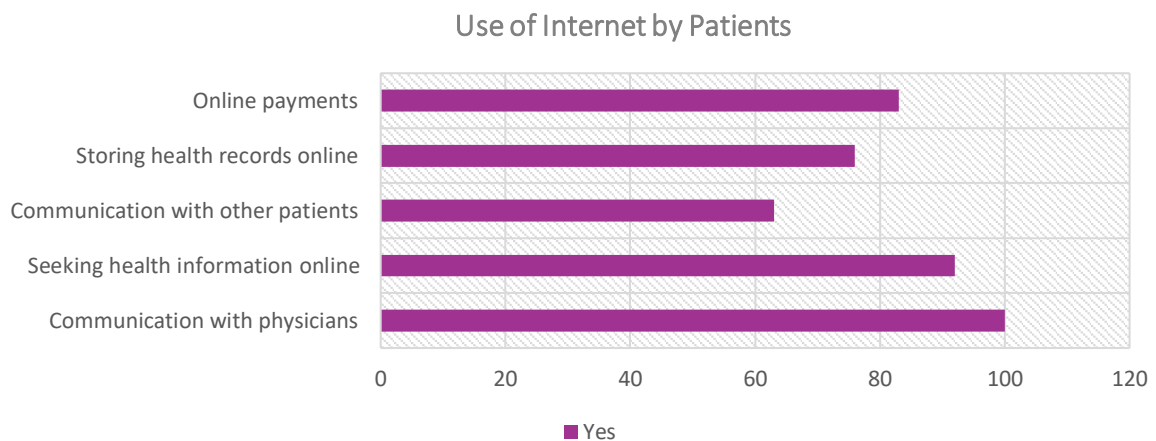


Figure 2: Communication platforms used by patients in seeking health services

The data collected from the study shows that most patients indeed rely on the Internet when seeking health care services and products. As such it can be deduced that the Internet plays a key role within patients in Bulawayo.

Communication Platforms Used by Patients

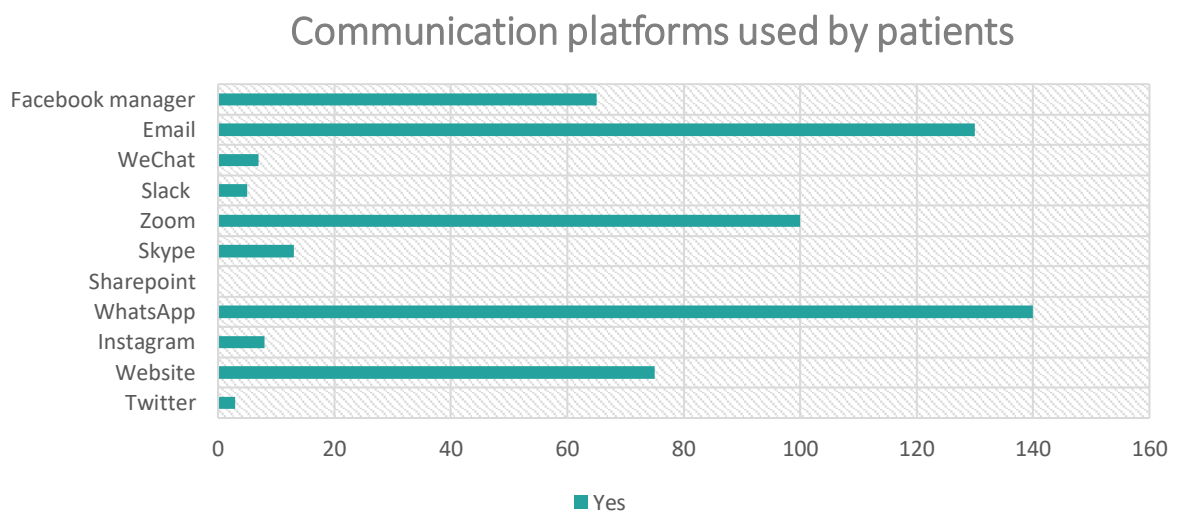


Figure 3: Communication platforms used by patients



The data gathered from the study shows that most patients use social media platforms such as WhatsApp, Facebook manager, Twitter and Instagram which are the very platforms that are usually censored by the government by means of shutting down the sites.

Number of Years Using the Internet to Seek Healthcare Services

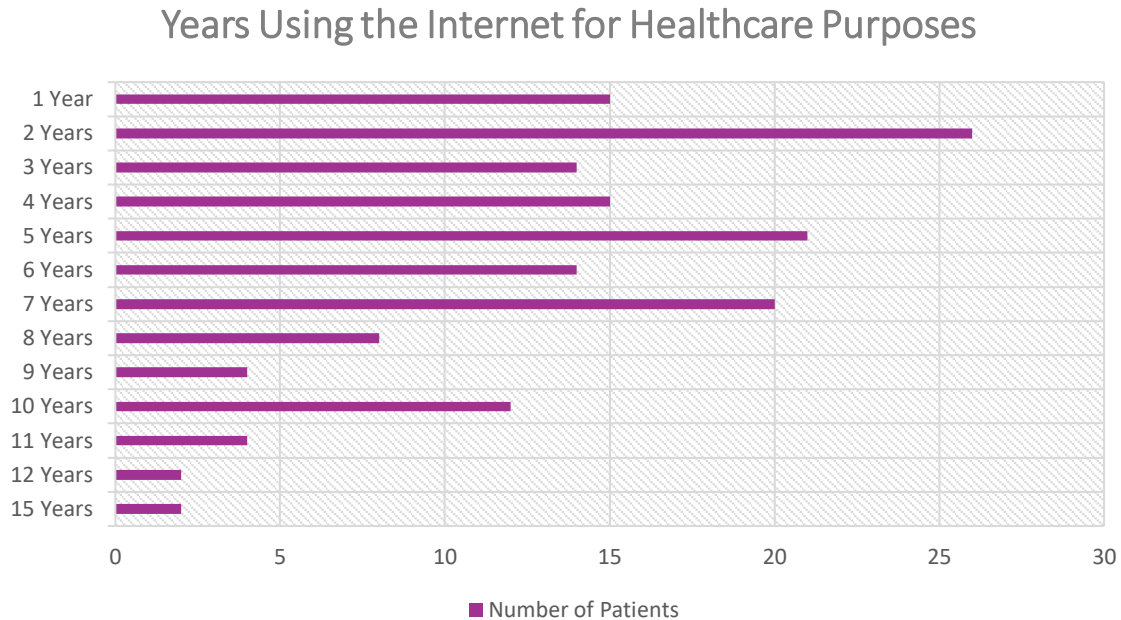


Figure 4: Years utilising the Internet

The responses shown in figure 4 show that patients have for long being using the Internet to seek health care services. Furthermore, the results of the study reveal that most patients have been previously affected by the government induced Internet shutdowns.

Use of the Internet in Delivery Health Services by Physicians

The research also sought to establish the various uses of Internet when seeking health care services. The responses are presented in the below folders.

Internet Usage by Private Practicing Physicians



Data collected shows that 97 (91%) of the PPPs utilise the Internet in their practice and only 9 (9%) do not. Furthermore, some PPPs utilise more than one service provider within their practices. An analysis of the results shown in figure 2 and 3 show that of all the 306 studied participants, 252 (82%) rely on the Internet when delivering or seeking health care services. This high usage percentage shows the importance of Internet in the Zimbabwean’s health care delivery system which is a clear message to the government not to disrupt the Internet.

Availability of Online EHRs

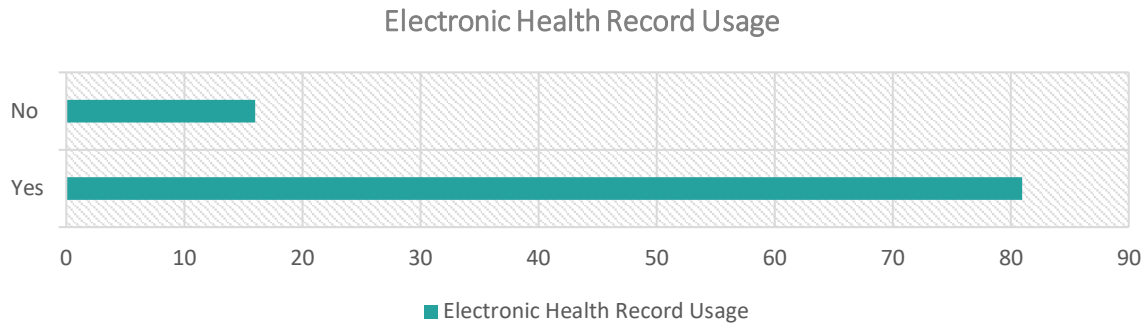


Figure 5: Availability of online EHRs

Uses of Internet in Practice

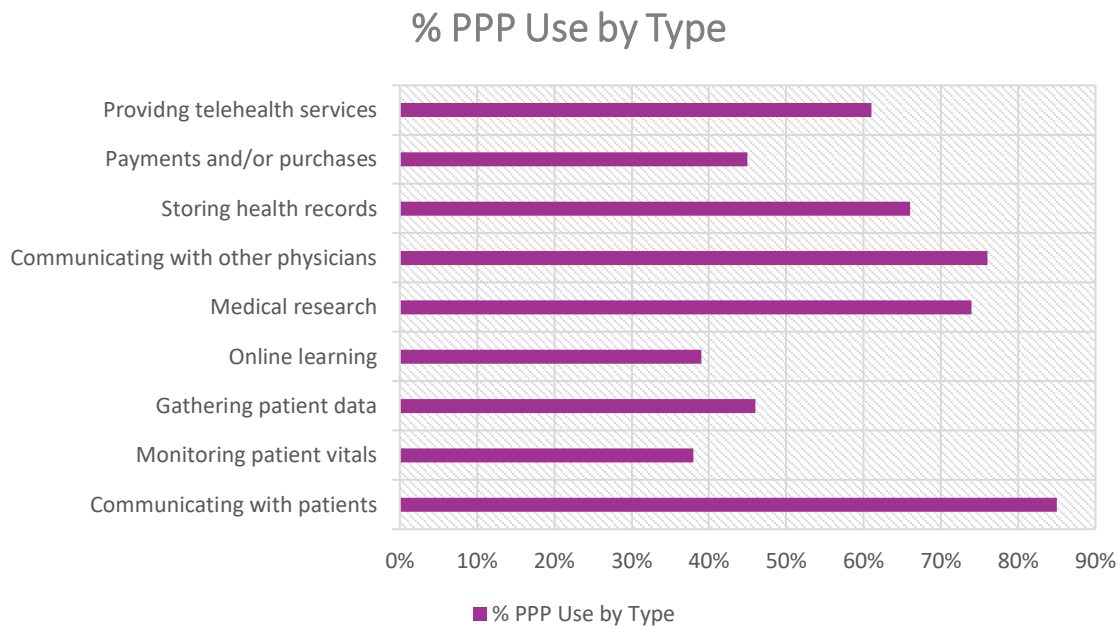


Figure 6: Internet Usage by PPPs

The data collected from the PPPs shows that most PPPs utilise the Internet for various uses. However, when measured in singular uses, the data shows that 81 (84%) of the PPPs mostly use the Internet for communicating with patients, 37 (38%) mostly use the Internet to monitor vital patients, 45 (46%) to gather patient data, 38 (39%) for online learning, 74 (74%) mostly use it to conduct medical research, 73 (75%) communicate with other PPPs, 64 (66%) for storing records health online, 44 (45%) for making payments online, and last but not least 59 (61%) for providing telehealth services. PPPs further showed that they mostly utilise the information to communicate with their patients and also to store online health records.



Communication Platforms Used by Private Practicing Physicians

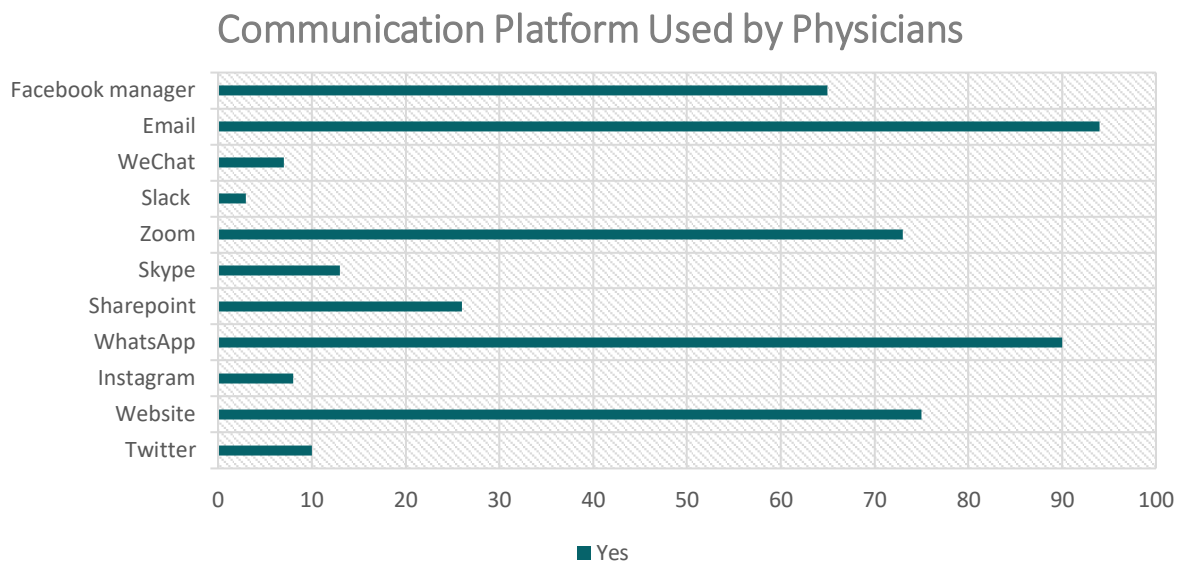


Figure 7: Communication platforms used by PPPs

Figure 7 shows that PPPs also use social media platforms to communicate with patients and other physicians. Often, government authorities and politicians discuss the “socially unproductive” uses and impacts of social media platforms. However, these findings certainly show how these platforms have critical uses in health care service delivery. As such this requires the government to be sensitised on the importance of social media platforms in the delivery of health services.

Effect of Network Disruptions on Healthcare Services

The study sought establish how network disruptions especially the Internet shutdowns affects health care service delivery. The results of the study are shown below.

Effects of Internet Shutdowns on Patients

The data shows that out the 157 patients who use the Internet in seeking health care services, 107 (68%) have been negatively affected by Internet shutdowns when seeking health care services, while the remaining 50 (32%) are not affected. The responses gathered in figure may mean that the 50 (32%) of patients were not seeking health care services during the time of Internet shutdowns in Zimbabwe and this may also mean some patients were not yet using the Internet to seek health care services.

When asked to describe how the Internet shutdowns have affected their health seeking practices, patients gave various descriptions with most of them centred on the failure to communicate with their PPPs, failure to search for online health information and the failure to make medical bills payments. It is essential to highlight that the failure for patients to perform such tasks, in particular the failure to make medical bill payments may in some cases result in delayed medical procedures subsequently resulting in patient conditions worsening and/ or even dying.

Areas affected by Internet shutdowns

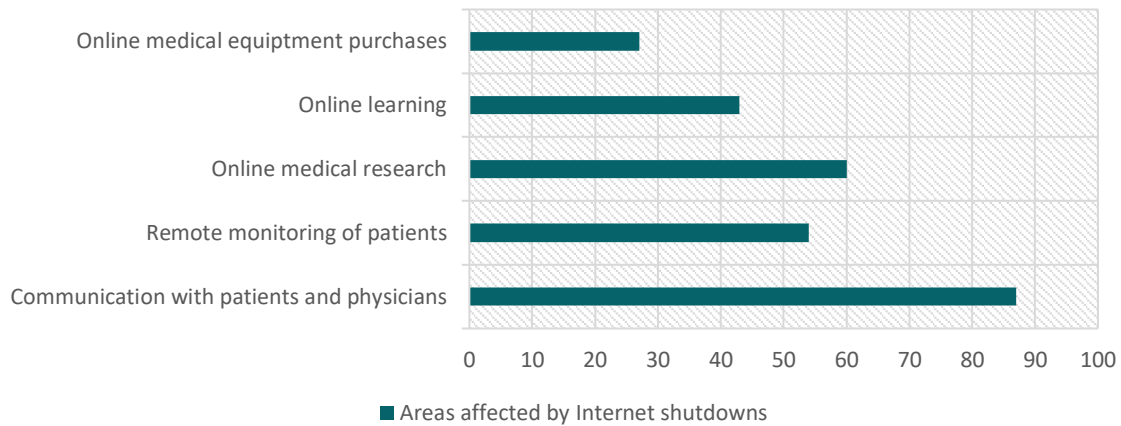


Figure 8: Areas affected by Internet shutdowns

Effects of Internet Shutdowns on Physicians

Physicians Affected by Internet Shutdowns

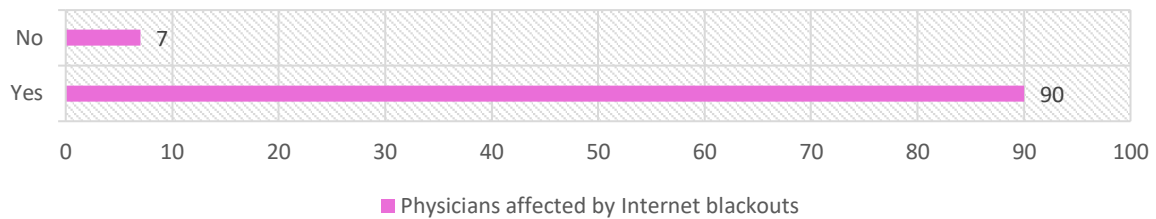


Figure 9: PPPs negatively affected by Internet shutdowns

Areas Affected by Internet Shutdowns

Areas affected by Internet Shutdowns

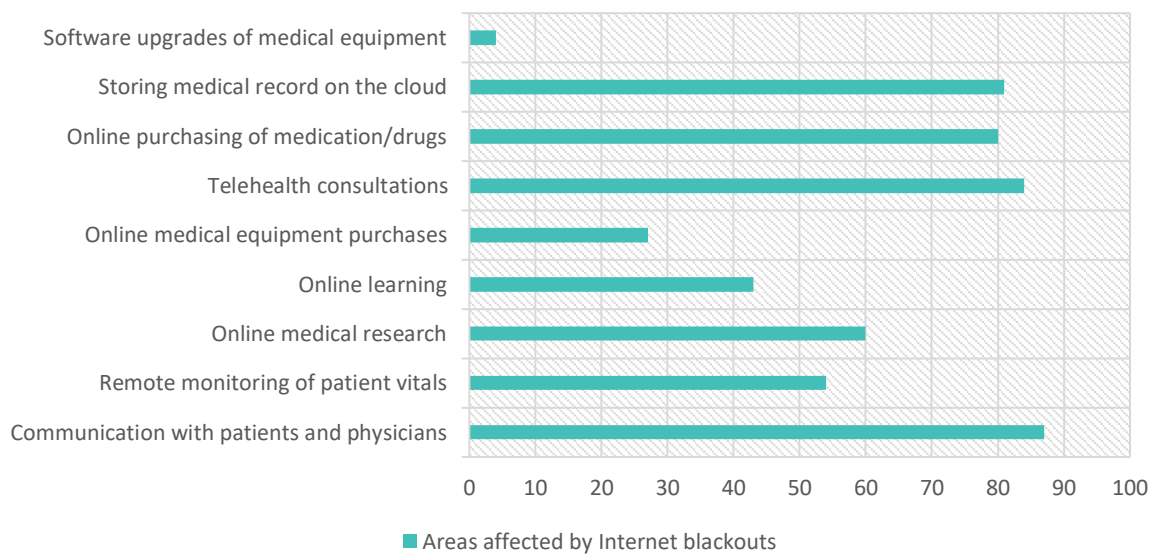


Figure 10: Areas affected by Internet shutdowns



Data gathered from the PPPs showed that 87 (97%) had their communication with patients and physicians disrupted, 54 (60%) had their remote patient monitoring negatively affected, 60 (67%) highlighted their research practices were negatively affected, 43 (48%) cited that their online learning was negatively affected, 27 (30%) highlighted that online medical equipment purchases were disrupted. Furthermore, 84 (93%) noted that their telehealth consultations were disrupted, 80 (89%) failed to purchase medication online, 81 (90%) failed to access their online patient health records, and last but not least only 4 (4%) failed to upgrade their medical equipment as a results of Internet shutdowns. The results obtained from physicians show that Internet shutdowns greatly affect health care processes which is detrimental to patient’s health.

Strategies for Circumventing and/or Ameliorating Challenges Associated with Internet Shutdowns

The study was also interested in understanding the various strategies of circumventing and/or ameliorating challenges associated with Internet shutdowns. The results from both physicians and patients are presented below.

Knowledge of Different Types of Internet Shutdowns

Physician Knowledge of Internet Shutdown Type

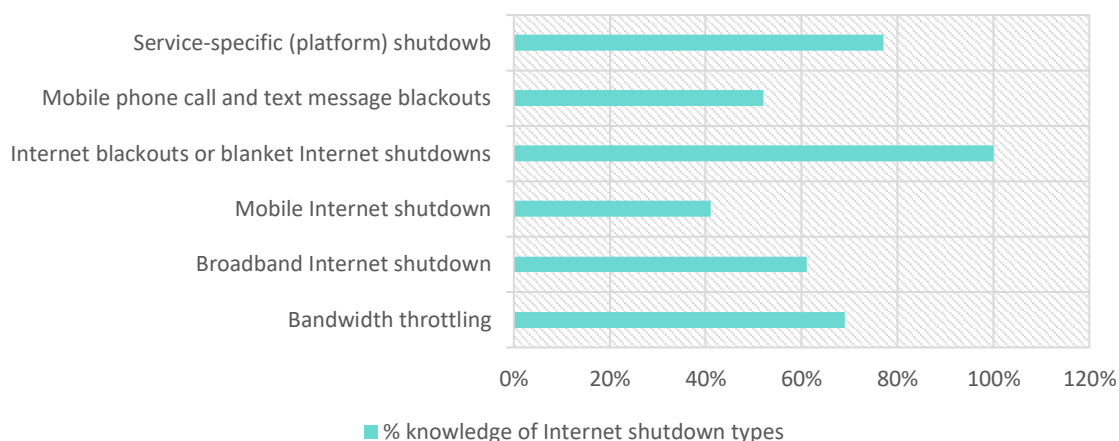


Figure 11: Physicians knowledge of Internet shutdown type

The responses gathered from PPPs shows that they have a general understanding of the various types of Internet shutdowns, with the most known being the service-specific blocking of apps and platforms. The responses show that 62 (69%) of the PPPs are knowledgeable about Bandwidth throttling, 55 (61%) know about broadband Internet shutdown, 37 (41%) know about Mobile Internet shutdown, while 90 (100%) showed that they are aware of the Internet blackouts or blanket Internet blackouts, 47 (52%) know about mobile phone call and text messages blackouts, and last 69 (77%) know about service specific shutdowns. This means that PPPs can easily identify Internet shutdowns in whatever forms they are deployed.



Patient Knowledge of Types of Internet Shutdowns

Knowledge of Internet Shutdown Type

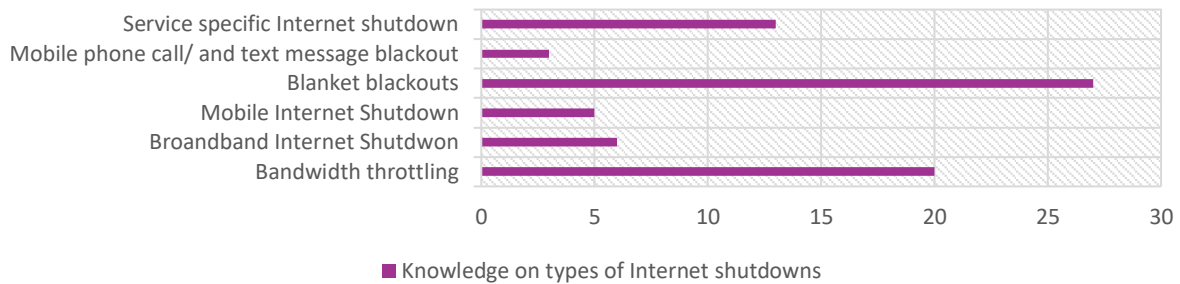


Figure 12: Patient’s knowledge on type of Internet shutdown

The data collected from patients shows that patients have knowledge of more than one type of Internet shutdown. For example, 39 (25%) of the patients showed that they were familiar with more than one type of Internet shutdown. However, when measured exclusively to one type of shutdown 42 (27%) know about complete Internet blackouts, while 31 (20%) know about bandwidth throttling, 21 (13%) know about Service specific shutdown, 8 (5%) know about mobile Internet shutdown, 10 (6%) know about Broadband Internet shutdown, 6 (3%) know about mobile phone call and text messages network blackouts. The data shows that patients have adequate knowledge on Internet shutdowns which is a good thing as they can easily identify an Internet shutdown when it happens.

Familiarity with Virtual Private Networks

Private Practicing Physician’s Knowledge of VPNs

The data showed in figure shows that 90 (93%) of the private practicing physicians out of 97 who use the Internet have knowledge of VPNs as tools to ameliorate the effects of Internet shutdowns, while the remaining 7 (7%) did not know about them. The 90 (93%) had once used VPNs during Internet shutdowns.

Specific Type of VPN

Knowledge of VPN by PPP

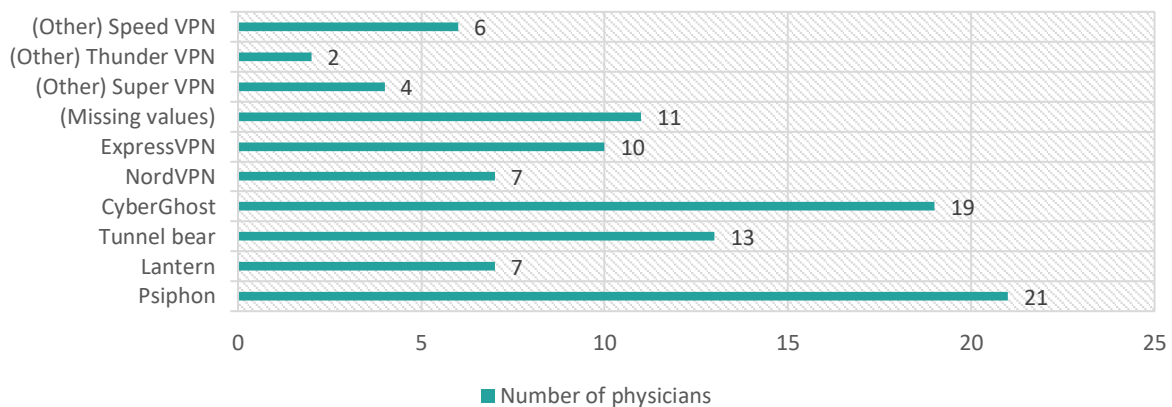


Figure 13: PPPs Knowledge on specific type of VPN



From the data gathered from the PPPs showed that they had once used various VPNs to ameliorate the effects of Internet shutdowns. 19 (22%) PPPs have knowledge of Psiphon VPN, 6 (7%) know the Lantern, 12 (13%) have knowledge of the Tunnel bear, 17 (18%) have knowledge of the CyberGhost VPN, 6 (7%) have knowledge of the NordVPN, and 9 (10%) have knowledge of the Express VPN. 10 (11%) were missing values, while the remaining percentages were distributed to other types of VPNs such as Super VPN 4 (4%), Thunder VPN 2 (2%), Speed VPN 5 (6%). The results of the study show that physicians had general knowledge on what VPNs are. Furthermore, the results show that most used VPNs during Internet Shutdowns by PPPs were paid VPNs.

Security, Ethical, Privacy, and Confidentiality Issues Surrounding Use of VPNs by Physician

When asked what level they understood security, ethical, privacy and confidentiality issues, PPPs gave varying responses, with most of them showing that they had generally low understanding of issues surrounding the usage of VPN in ameliorating Internet shutdowns. For example, when it came to security issues surrounding the use of VPNs 35 (39%) PPPs disagreed the notion that they knew anything to do with security, while 27 (30%) strongly disagreed, 11 (12%) were neutral. Only 4 (4%) strongly agreed that they understood security implications in the use of VPN and the remaining 13 (14%) simple agreed. Overall this shows that a total of 71 (79%) of the 90(100%) PPPs who had highlighted that they had knowledge of VPNs did not know the essential issues surrounding the use of VPNs. Furthermore, the results showed that a total of 76 (84%) of the PPPs did not have knowledge on ethical issues surrounding the use of VPNs, and last but not least a total of 73 (81%) of the PPPs had no knowledge on the privacy and security issues surrounding the use of VPN.

Patient Knowledge on Types of VPNs

The study was further interested in establishing the patient’s knowledge of various types of VPNs as used in ameliorating Internet shutdowns.

This study showed that 93 (87%) patients out of the 107 (100%) who had highlighted that they are affected by Internet shutdowns (see figure 10) showed that they had knowledge of VPNs while the remaining 14 (13%) do not have knowledge on VPNs. This means that a significant number of patients are able to utilise VPNs during Internet shutdowns.

Specific type of VPN

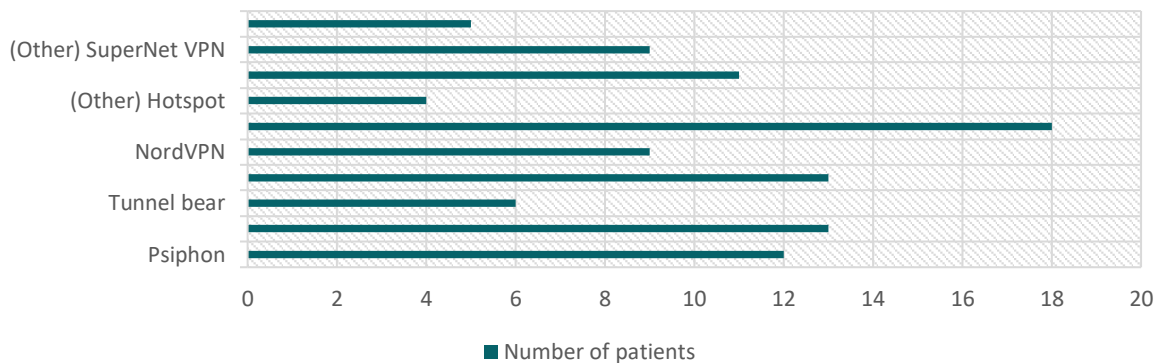


Figure 14: Patient knowledge on specific type of VPN



The data in figure 19 shows that out of 93 patients who highlighted that they have knowledge of VPNs (see figure 22) 11 (12%) used Psiphon, 12 (13%) used Lantern, 6 (6%) used Tunnel bear, 12 (13%) used CyberGhost, 8 (9%) used NordVPN, 17 (18%) used Express, 4 (93%) used Hotspot VPN, 10 (11%) used Droid VPN, 8 (9%), 5 (5%) used Secure VPN. The general response of the study showed that most patients used paid VPNs while other used freely available VPNs.

Security, Ethical, Privacy, and Confidentiality Issues Surrounding use of VPNs by Patients

The data gathered from the study showed that most patients 65 (70%) did not understand the security issues of using VPN during Internet shutdowns, while a total of 28 (30%) highlighted that they understood security issues related to the use of VPN. Furthermore, the data showed that when it comes to issues related to privacy and confidentiality 54 (58%) understand the key issues surrounding privacy and confidentiality. However, when it came to ethical issues a total of 63 (72%) showed that they do not understand ethical issues surrounding VPN usage. The use of VPNs without knowledge on key issues of security, privacy, and confidentiality leaves patient's confidential data vulnerable to hackers and this may have far reaching negative consequences

Physician's Comments About Internet Shutdowns in Healthcare Service Delivery

The study further sought to find out the PPPs' comments about Internet shutdowns in health care service delivery. Some of the comments from PPPs are presented as direct quotations in the text boxes below.

- *"If only our leadership knew how these network disruptions negatively affect us, they would not shutdown the Internet. So it would be nice if they do not shutdown the network."*
- *"Internet plays a huge part in the medical field as it is used for all means of communication, analysis, and data collection of patients etc. Therefore and improved Internet services will do better and boost our medical scope."*
- *"They cast a shadow of doubt on the effectiveness of online health solutions and telemedicine."*
- *"We are now relying on the Internet more and more. It is necessary to avoid such disruptions as it can cost lives."*
- *"The inability to access information or to communicate has a significant bearing on the quality of healthcare that we can provide. It can cost lives."*
- *"We communicate with patients through the Internet as such network should not be blacked out."*

What can be deduced from the responses given by the PPPs is that they all lamented on the negative effects of Internet shutdowns in how they deliver health care services. This is especially true considering that the comments from PPPs centred on Internet shutdowns affecting their communication with patients as such disrupting the flawless health service delivery system.



DISCUSSION

This section discusses the findings of the study based on the research questions.

Use of the Internet in the Delivery of Healthcare Services by PPPs and Patients in the Bulawayo Metropolitan Province

The data gathered from both the patients and PPPs showed that both stakeholders heavily rely on the Internet in accessing and delivering of health care services. The high usage of the Internet in the health care delivery system may also be credited to the high Internet usage by general Zimbabweans (Kemp, 2021). Patients highlighted that they mostly communicate with their PPPs and in some cases, they often seek online health information for the purposes of self-diagnosis. It is essential to highlight that the use of the Internet by the studied patients can also be generalized to other case studies across Africa. For example, a study by Asibey, Agyemang, and Dankwah, (2017) on Internet use for health information among Ghanaian University Students revealed that Ghanaian university students are active users of the Internet. From a total of 650 students, about 440 (67.7%) revealed that they use Internet for health purposes. 294 (45.2%) students noted that they access Internet from campus labs while 229 (35.2%) accessed Internet from halls and hostels. Asked on the reasons for Internet usage for health, 249 (56.6%) noted that the Internet has vast amount of valuable information available, 340 (77.3%) revealed that there is anonymity, privacy, and confidentiality when access health information other than visiting a general practitioner. Seeing that most of the studied patients were between the ages of 21 to 35 it may mean that some of these patients are also students who use the Internet to seek health care information. An interesting finding from existing literature is that the anonymity, privacy, and confidentiality of the Internet is what also draws many patients to utilize the Internet in seeking health information. Furthermore, the high use of the Internet by the studied patients may be a result of the convenience that comes with the Internet, in that both PPPs and patients can seamlessly communicate anywhere and anytime (Madziwa, 2018).

As highlighted by Ngwenya, (2017) and Madziwa, (2018) the health care delivery system in Zimbabwe is overburdened by the growing population and as such a significant number of patients and doctors now prefer the use of the Internet to ease the pressure exacted on physical facilities. The aforementioned arguments explain the high Internet usage rate by both the PPPs and the patients. Furthermore, the usage of the Internet in seeking health care services by patients may also be a cost saving measure especially for patients who live far away from the PPPs. Madziwa, (2018) highlighted that patients who live outside of Bulawayo with minor conditions preferred e-consultation than travelling long distances to meet their doctors. This may also explain the high Internet usage by patients and PPPs. The study also found out that patients and PPPs also use the Internet to make payments of medical bills and buy medication online. This finding does not come as a surprise within the context of Zimbabwe, considering that there has been a significant shortage of cash within the economy as such most people are now using wireless transactions (Mazorodze, 2018). Therefore, it can be summarized that the high Internet usage by both patients and PPPs as founded by the study is not a surprise based on the issues discussed.



Effect of Network Disruptions on Healthcare Services Among PPPs and Patients in the Bulawayo Metropolitan Province

The study established that Internet disruptions (Internet shutdowns in particular) negatively affected the way in which PPPs delivered health care services and the way in which patients access health care services. A significant number of patients highlighted that Internet shutdowns negatively affected their communication with PPPs and furthermore, since they also used the Internet to seek online health information, this was affected too. Despite a dearth of studies on the effects of Internet shutdowns in health care delivery, a few studies have shown that blacking out the Internet negatively affects the manner in which patients access online health information (Mbah, Nkangu and Rogoff, 2018). A study carried out in India showed that since the COVID-19 global pandemic started people in India have not been able to “access websites that provide information about the pandemic” due to Internet shutdowns. Such a situation has left people failing to take some of the best care in dealing with the effects of COVID-19 as such most of them succumbing to the virus (United Nations, 2021). In Ethiopia millions of people in the Western Oromia are missing key information about COVID-19 because of the government induced Internet shutdowns (United Nations, 2021). In Bangladesh Internet shutdowns have jeopardized the lives of about 900 000 refugees who fail to access health care information (United Nations, 2021). The findings of the study showed that patients failed to communicate with their PPPs in this negatively affected the way in which they dealt with their ailments. This is especially true for those patients who highlighted that they had chronic conditions as they had to constantly check with their PPPs. It is important to note that the same effects being faced in the presented case studies, are the same effects faced by patients and PPPs in Bulawayo Metropolitan Province.

Circumventing and/or Ameliorating the Challenges Associated with Internet Disruptions

The findings of the study highlighted that patients and PPPs used tools such as VPNs to ameliorate the effects of Internet shutdowns. The findings of the study also showed that some patients and PPPs resorted to the use of making direct phone calls which had their negative effects since they were expensive. As much as VPNs play a crucial role in dealing with Internet shutdowns in which key social media and communication platforms are blocked or restricted, (Mbah, Nkangu and Rogoff, 2018) it is worrying that a significant number of PPPs and patients had no adequate knowledge on key issues related to the use of such tools. This exposed their private and confidential data unauthorised access by third parties. Constantin, (2017) notes that VPNs pose serious risks to users, because attackers sitting on the same networks can use various techniques to hack their information. As such as much as patient and PPPs used this technique it was not wise because they lacked understanding on risks associated with VPN usage. Other patients and PPPs highlighted that they also made direct calls to contact each other. As much as this method was effective it is worth noting that direct call charges in Zimbabwe are relatively higher as such some patients cannot afford their regular usage. Therefore, what can be summarized from this discussion is that Internet shutdowns forced patients and PPPs to unknowingly expose their private and confidential information to unauthorised third parties and also posed negative impacts on their budgets since they had to resort to financially uncomfortable methods of communication.



CONCLUSIONS

The study makes the following conclusions

- A lot of patients and PPPs in the Bulawayo Metropolitan Province utilize the Internet in seeking and delivering health care services, respectively.
- The effects of Internet disruptions have serious negative implications on how patients and PPPs access and delivery health services, respectively. Internet shutdowns negatively affect the communication processes of both patients and PPPs. Furthermore, PPPs and patients fail to make online payments and fail to access online health information.
- Patients and PPPs utilize VPNs to circumvent the challenges associated with Internet disruptions. However, there is generally a low understanding of the implications of using such tools which leaves patients and PPPs' information exposed to third parties. Furthermore, although patients and PPPs have sought legal action against Internet shutdowns the results of such actions remain unknown since most network providers are greatly influenced by government directives.

RECOMMENDATIONS

Based on the findings of the study, the researcher makes the following recommendations.

- The government of Zimbabwe should effectively consider the effects of Internet shutdowns on health care service delivery and as such avoid the shutting down of the Internet.
- There is need for patients and PPPs to invest more time in learning about the implications of using VPNs to have a proper understanding of such tools before they adopt their use.

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