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Comparative Study of Internet Accessing Households in Urban and Rural Areas before the Pandemic During the Pandemic

Aditya Nayahita[1]
[1]Sekolah Menengah Atas Negeri 1 Taman,
Sidoarjo, East Java, Indonesia.

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ABSTRACT

This research aims to review household internet use, especially before and during the pandemic. In addition, this research tests and provides evidence that internet use in urban and rural areas still experiences differences in users. Data was taken from the Central Statistics Agency in 2019-2021 for all provinces in Indonesia except DKI. The analysis tools in this research are the Kruskal-Wallis and Wilcoxon Signed Ranks tests. The test results show differences in users between urban and rural areas. Apart from that, there are also differences in internet users based on changes in time over three years. The conclusion is that internet use in Indonesia is increasing daily, but there are still differences in users in urban and rural areas.

Corresponding Author:

Aditya Nayahita,
Sekolah Menengah Atas Negeri 1 Taman,
Sidoarjo, East Java, Indonesia.
Email: adityasmanita@gmail.com

1. INTRODUCTION

Internet use in the industrial ERA 4.0 is getting busier every day. In every corner of cities and rural Indonesia, you can often find everyone accessing the Internet. Accessing the Internet can be done in various ways. However, the development of the Internet at the start of the pandemic, namely 2019, was a significant change point. This is because in 2020 and 2021, there was a pandemic. Therefore, internet development has changed drastically due to the work-from-home (WFH) factor, for example, via cell phone, laptop, or Personal Computer (PC) (Guo et al., 2023; Jia et al., 2021).

Other factors that trigger internet use include purchasing data packages for cell phones and the availability of accessible internet networks such as in coffee shops, terminals, offices and other public facilities. Ifinedo (2011) has initiated an exploratory investigation regarding accepting Internet technology and e-business among small and medium enterprises (SMEs) in Canada. Furthermore, the research emphasizes the importance of designing initiatives that can reduce barriers to technology acceptance, including providing training, resources, and financial incentives to encourage the integration of Internet technology in their business operations (Hossain et al., 2022).

In the current era, the Internet has spread to all regions in Indonesia, both rural and urban. With the construction of various cellular telephone and internet infrastructure in all these areas, there has been a shift in business distribution, which is not only concentrated in urban areas. However, business has also shifted to rural areas. Thus, the business sector relies on more than formal business, characterized by establishing offices or shops to market services and goods. On the other hand, Whitacre and Mills (2007) discuss the role of infrastructure as a significant determining factor in this division. Infrastructure conditions show that rural areas often face obstacles in developing and maintaining internet infrastructure that supports high access

levels. Factors such as management costs and service availability can influence rural areas' ability to provide internet access equivalent to urban areas.

The results of research conducted by Mora-Rivera and García-Mora (2021) offer important insights into the relationship between internet access and poverty reduction while calling for policymakers to focus on digital empowerment in rural areas as a critical strategy for achieving economic inclusion and the greater one. Discussion of the differences between the impact of internet access in rural and urban areas. Although the Internet provides positive benefits in both environments, research shows its impact is more significant in rural areas. This research highlights the importance of paying attention to regional and environmental contexts when designing policies to increase internet access as a tool for poverty alleviation (Borowski & Stathopoulos, 2023). In addition, this research emphasizes the policy implications of the findings of this research. Therefore, the government and related stakeholders need to prioritize the development of internet infrastructure in rural areas through digital empowerment and education programs. These efforts can help ensure that the benefits of the Internet are evenly distributed and effectively reduce economic inequality between rural and urban areas. Hopefully, this study will provide evidence that there are still differences in internet access households between urban and rural areas (ZHOU et al., 2020).

Internet use in urban and rural areas of households, especially teenagers, has significant differences. Teenagers in urban areas have faster internet access compared to internet use in rural areas. In their research, Chang et al. (2016) have shown differences in mediation strategies between parents in urban and rural areas. Parents in urban areas tend to be more active in monitoring and guiding their children in using the Internet. In contrast, rural parents tend to lean more towards looser supervision.

In general, according to Feher and Towell (1997), internet use emphasizes the vital role of the Internet in creating innovation opportunities and new business models. Businesses that can harness the potential of the Internet to design new products or services, improve customer experiences, and create added value can form a strong foundation for long-term growth. Thus, intelligent and progressive businesses must strategically integrate the Internet into their operations and business strategies to remain relevant and competitive in the current digital era, both in rural and urban areas, including household users, to take advantage of business opportunities (Worden & Hambly, 2022).

2. HYPOTHESIS

Based on the findings of Apăvăloaie (2014), there have been fundamental changes in how businesses operate due to internet penetration. The Internet has provided broader and faster access to information, opened global opportunities, and changed how companies interact with customers and business partners. This transformation creates a more dynamic and competitive business environment. Besides that, the role of the Internet is in creating new business models and increasing operational efficiency. The concept of online business and e-commerce is taking centre stage, enabling companies to reach a broader market and optimize their supply chains. The Internet also facilitates the adoption of the latest technologies, such as artificial intelligence and data analysis, to improve business decision-making. In his research, he evaluated the impact of the Internet on customer interactions and marketing (Sak & Yavuzyiğit, 2023; Yuen et al., 2024). The Internet provides a platform for companies to interact directly with customers through social media, online reviews, and digital customer service. In addition, digital marketing and consumer analytics supported by the Internet enable companies to understand customer preferences and develop more targeted marketing strategies (Neuman & Powers, 2022).

Challenges that arise along with the transformation of business by the Internet. Cyber security, data privacy and increasingly fierce competition are some of the aspects that companies need to manage wisely. Therefore, inter-capital services in urban and rural areas need continuous adaptation and innovation so companies can continue developing in the ever-changing digital era. By providing a holistic picture of the Internet's impact on the business environment, this article guides business leaders and stakeholders to identify opportunities, overcome challenges, and design strategies responsive to technological developments and consumer trends in the digital era (Matli & Phurutsi, 2023).

Furuholt and Kristiansen (2007), in their research, also discussed internet use in rural and urban areas in Tanzania by exploring regional aspects of internet use. In his article, he highlights a natural digital division between rural and urban areas in Tanzania. Research findings show that internet access and use tends to be higher in cities than in rural areas, creating digital divisions that can strengthen regional social and economic disparities. Kiptalam and Rodrigues (2010) conducted similar research in Kenyan secondary schools, which focused on comparisons between schools in rural and urban areas. The research highlights the implementation of internet connections in secondary schools as a strategic step in increasing access to education. This research compares internet use in schools in rural and urban areas, seeking an in-depth understanding of how much this technology is used in educational contexts in two different environments, interesting research findings regarding internet use in both types of schools. Although internet connections

have been introduced in both rural and urban schools, this study shows that there are significant differences in their utilization rates (Mullick & Patnaik, 2022). Urban schools tend to use the Internet more intensively for educational purposes, giving students access to a greater abundance of digital resources and online learning compared to rural schools.

Based on thoughts and studies, as well as the use of data for four years, the following hypothesis can be made:

H_1: Household internet use in urban areas is more significant than in rural areas

H_2: There are differences in internet users in urban or rural areas based on year

3. METHOD

This investigation primarily leans on empirical data sourced from the Central Statistics Agency spanning the years from 2019 to 2022. The selected data specifically revolves around the trends of internet usage within both urban and rural settings, providing a comprehensive snapshot of digital connectivity across different societal strata over a substantial period of time. The methodology adopted to examine and interpret this data involves two key analytical techniques, the Kruskal-Wallis test and the Wilcoxon Signed Ranks test. These statistical methods each serve unique roles and together form a robust toolbox for handling the data in this study (Matli & Phurutsi, 2023; Yuen et al., 2024).

The Kruskal-Wallis test, a non-parametric statistical method, is famed for comparing mean ranks. It's an invaluable tool that offers a granular picture of variation among different groups. The implementation of this test in the research allows the investigators to look beyond superficial trends and dig into the heart of the data, seeking out and highlighting the subtle differences among groups that might otherwise go unnoticed. This discerning look into the data leaned heavily on the advantages of the Kruskal-Wallis test, setting a strong foundation for the research (Pesci et al., 2023).

Together with the Kruskal-Wallis test, the research also deploys the Wilcoxon Signed Ranks test. This test provides a complementary lens through which to view the data. While the Kruskal-Wallis test helps identify and quantify variances among different groups, the Wilcoxon Signed Ranks test assists in detecting any shifts or changes in trends over the study period.

This blending of both these analytical processes provides a robust and thorough investigation into the digital behaviors of both urban and rural populations. With its holistic approach towards data, leveraging both these statistical tests, the research presents a thorough examination of the habits and preferences of these population groups, helping to better contextualize the importance of internet connectivity within our society.

The exhaustive process of data collection, selection, and analysis lends credence to the integrity of the research. It underscores how the study paper leaves no stone unturned in its quest for untangling complex patterns of internet usage. To corroborate hypothesis 1, the research favors the employment of the Kruskal-Wallis test. This tool elegantly handles the task of comparing mean ranks, affording a fine-grained perspective into the dissimilarities among various groupings. This rigorous approach ensures that the study does not miss out on any relevant variance in the data, thus meeting the stipulations of hypothesis 1.

Utilizing the Kruskal-Wallis test as a crucial part of hypothesis validation reaffirms the commitment of the study to rigorous and evidence-based research. The careful deployment of this method positions it as a cornerstone of the analytical process, contributing to the study's comprehensive exploration of the trends in internet usage patterns. The calculated and deliberate methodology of this research leverages proven statistical tools, such as the Kruskal-Wallis and the Wilcoxon Signed Ranks tests, to dissect the data. These techniques work in unison to unearth and highlight valuable insights buried within a sea of statistical noise. The interplay of these tests, along with careful data collection and selection methods, lays a solid foundation for the study to be grounded upon (Matli & Phurutsi, 2023).

In conclusion, the research methodology adopted here revolves around a rigorous analytical approach that prioritizes accuracy and precision. Using the Kruskal-Wallis and Wilcoxon Signed Ranks test in tandem ensures that no stone is left unturned in the quest for understanding the patterns of internet usage within different populations. This holistic approach towards data analysis provides a sturdy scaffolding for the research to stand upon, greatly enhancing the reliability of the study (Arin et al., 2022).

In parallel, the verification of hypothesis 2 leans on the implementation of the Wilcoxon Signed Ranks test. This non-parametric statistical procedure, developed to compare two interrelated samples or repeated metrics is utilized from a single sample to determine if their population mean ranks are substantially different. The application of this test comes with a confidence level set at a high bar, 95%. This high degree of certainty underpins the validity and comprehensiveness of the results to be discussed, reinforcing the confidence in the findings of this research (Elam et al., 2022).

Thereon, both the Kruskal-Wallis and Wilcoxon Signed Rank tests are activated, forming a pivotal segment of the research methodology. These two reliable and proven statistical tests, when used together, offer a comprehensive analytical framework that can handle a wide range of data. They work to highlight and elaborate on the complex patterns and intricacies within the data, ensuring nothing of potential importance is missed or overlooked.

In addition to these main analytical tools, the study also incorporates a crucial step, the normality test. The normality test is run with the primary goal of confirming the normal distribution of the data set. This process serves as a sanity check for the dataset, certifying that the primary model assumptions hold. Ensuring that the data follows a normal distribution is fundamental to most parametric statistical tests.

By confirming the normal distribution of the data, the research ensures the soundness and appropriateness of the chosen analytical tests, Kruskal-Wallis and Wilcoxon Signed Ranks. Should the normality test indicate a significant departure from a normal distribution, appropriate steps would be undertaken to address this divergence, such as a transformation of the data or the use of an alternative, non-parametric test. This three-pronged approach, combining the Kruskal-Wallis test, the Wilcoxon Signed Ranks test, and the normality test, ensures a robust, comprehensive analysis of the data. Each of these methods has its significant role to play, and their collective application ensures an all-encompassing view of the internet usage patterns across different demographic groups over the study period (Lee et al., 2023).

On the whole, the research methodology is a meticulously crafted strategy that relies on proven statistical techniques for data analysis. Deep-diving into the database with the Kruskal-Wallis and Wilcoxon tests for pinpointing patterns, to ascertaining normal distribution of the data using the normality test, the research leaves no stone unturned in its quest to shed light on internet usage dynamics in both urban and rural populations from 2019 through 2022.

The deliberate, step-by-step approach to evidence collection and analysis assures the rigor and reputation of the study. By encapsulating these time-tested analytical tools within its methodology, the work underpinning this research underscores a commitment to robust empirical enquiry, strengthening the discipline's understanding of complex societal phenomena. In seeking to thoroughly understand and dissect the intricacies of the data at hand, a comprehensive and meticulous methodology is established. Anchoring this methodology is a multistep process that begins with a pivotal assurance of reliability – the normality test.

The normality test verifies that the data follows a Gaussian distribution, often referred to as a normal distribution. A normal distribution is crucial to many statistical methods as it is a significant underlying assumption. When data follows a normal distribution, it means that most data points cluster around the average, and this distribution will be symmetric, creating a bell-shaped curve on a frequency graph, widely known as a bell curve or Gaussian curve. By ascertaining the normal distribution of the data, the science behind implementing statistical tools is backed up with a firm reassurance, paving the way for an accurate and comprehensive analysis.

Upon confirmation of the normal distribution, the journey of exploration through the maze of data from the Central Statistics Agency continues, with the main objective being to decipher the enigma of internet usage in the undulating landscapes of the urban and rural terrains within the timeframe beginning in 2019 and ending in 2022. Following this initial understanding of the dataset, the next pivotal step, hypothesis testing, is undertaken. The methodical procedure for hypothesis testing is broken down as follows:

Hypothesis Testing 1

H_{o1}: $\mu_1 \leq \mu_{2,}$ probability value (p-value) $\geq$ 5%, then there is no difference between internet user households in urban and rural areas

H_{a1}: $\mu_1 > \mu_{2,}$ probability value (p-value) < 5%, then there are differences in internet user households in urban and rural areas.

Description:

Null Hypothesis (Ho1): $\mu 1 \leq \mu 2$. If the probability value (p-value) is greater than or equal to 5%, it implies there is no significant difference between the proportions of internet-using households in urban and rural areas.

Alternative Hypothesis (Ha1): $\mu 1 > \mu 2$. If the p-value is less than 5%, there is evidence to suggest that there is indeed a significant difference between the proportions of internet-using households in urban and rural areas.

In this instance:

$\mu 1$ is indicative of the mean population of internet users in urban settings,

$\mu 2$ represents the mean population of internet users based in rural settings.

Hypothesis Testing 2

H_{o2}: $\mu_1 \leq \mu_2$, probability value (*p-value*) $\geq$ 5%, then there is no difference between internet user households in urban and rural areas

H_{a2}: $\mu_1 > \mu_2$, probability value (*p-value*) < 5%, then there are differences in internet user households in urban and rural areas.

Description:

Null Hypothesis (Ho2): $\mu 1 \leq \mu 2$. If the p-value is greater than or equal to 5%, it implies there is no significant change in the median population of internet users in either urban or rural areas across the years.

Alternative Hypothesis (Ha2): $\mu 1 > \mu 2$. If the p-value falls under 5%, this implies there are significant changes in the median population of internet users in either urban or rural areas across the years.

Where:

* $\rho 1$ illustrates the Median population of internet users in designated areas during 2019.
* $\rho 2$ specifies the Median population of internet users in respective areas throughout 2020.
* $\rho 3$ reveals the Median population of internet users in the assigned area come 2021.

This rigorous step-by-step approach to navigate through the vast ocean of data availed elucidates the complexities surrounding the internet usage trends. It offers a revealing understanding of changes in household internet usage in both urban and rural areas. This concrete verification of knowledge, backed by reliable statistical tools in action, contributes to an evidence-based narrative about the digital connectivity across various strata of society, thus equipping policymakers and stakeholders with the necessary insights to shape their strategies and initiatives.

4. RESULTS

The process of statistical evaluation commences with preliminary descriptive statistical tests to discern the mean and median of the datasets, considering their regional and annual variations. The data showcases that on average, urban households outstrip their rural counterparts in terms of internet usage, albeit the mean difference remains rather marginal. However, a more considerable disparity is observed when comparing mean and median values for rural areas (Delgado Martín & Larrú Ramos, 2022).

Considering the global pandemic causing a surge in internet consumption, analyzing the growth rates from 2019 through 2021 provides crucial insight. For urban household internet users, the mean usage levels are found at 83.38%, 86.95%, and 89.61% for the respective years. Consequently, an approximately 6.23% increase in internet usage characterizes the pandemic era. The rural areas, on the other hand, exhibit a remarkable average growth rate of 15.24%. This data highlights the significant expansion of Internet infrastructure within these regions. Nonetheless, further examination of the mean and median differences is required.

A comparative look at the mean and median differences brings into focus the disparities between urban and rural internet users. In urban areas, the difference between these two measures is rather minimal, while it is substantial for rural regions. This finding could suggest the presence of varying patterns of internet usage within rural areas, which warrants a deeper understanding of the contributing factors and potential implications (Greenfield et al., 2021; Zgheib et al., 2023).

To precisely investigate these dynamics of internet use in both urban and rural settings, robust analytical techniques are employed. The Kruskal-Wallis test is utilized to compare the mean ranks of various groups in an effort to assess hypothesis 1, while the Wilcoxon Signed Ranks test with a 95% confidence level evaluates hypothesis 2 by comparing the population mean ranks of two related samples. Additionally, a normality test is conducted to confirm the normal distribution of the data points, ensuring the reliability and accuracy of the results.

With the aid of these rigorous methods of analysis, valuable discoveries pertaining to internet usage patterns can be uncovered. These insights will shed light on the varying degrees of internet accessibility and infrastructure development within urban and rural communities, ultimately enabling a greater understanding of the correlation between communication technology and the changing socio-economic landscape, particularly during the time of COVID-19 (Adibfar et al., 2022).

This comprehensive evaluation of empirical data from the Central Statistics Agency attests to the remarkable growth of internet infrastructure in rural communities, which has drastically outpaced that of urban regions during the pandemic. Although disparities in mean and median usage levels persist amongst rural internet users, such findings emphasize the pressing need to further analyze the underlying factors shaping these disparities. By continuing to explore these patterns and their implications, researchers and

policymakers alike can develop targeted initiatives promoting a more equitable digital landscape for all communities, irrespective of location.

Table 1. Descriptives Statistic

	Year		Statistic
URBAN	2019	Mean	83,38
		Median	83,30
	2020	Mean	86,95
		Median	87,36
	2021	Mean	89,29
		Median	89,61
RURAL	2019	Mean	59,02
		Median	62,52
	2020	Mean	65,50
		Median	68,13
	2021	Mean	72,26
		Median	74,96

Source: Appendix 1

A data normality test was carried out before carrying out the research hypothesis using the Kruskal-Wallis difference test. The normality test results show that the data is not normally distributed. This happens because the difference between the mean and median data, as shown in Table 1, is quite significant. Therefore, carrying out the next difference test is not based on the parameter statistical test in the form of an independent t-test. Normality test results were carried out using the Kruskal-Wallis test with the premise that the test is based on the mean difference test for rank data.

Tabel 2. Normality Test by Kolmogorov-Smirnov Test

No	**Year**		**Statistic**	**p-value**	**Conclusion**
	2019	6	.163	.000	the data is not normally distributed
	2020	8	.140	.002	the data is not normally distributed
	2021	6	.133	.006	the data is not normally distributed
	Total	100	.111	.000	the data is not normally distributed

Source: Appendix 2

The results of the normality test can be seen in Table 2 in Appendix 2, showing that the data regarding the percentage of internet users in both rural and urban areas for three years is based on the Shapiro-Wilk and Kolmogorov-Smirnov tests because the data is not normally distributed. Therefore, to test hypothesis one (H_1) in this study, it is based on Kruskal-Wallis, which is a non-parametric test.

Furthering our exploration of the vast dataset, we moved towards the application of the Kruskal-Wallis test. This test was crucial to the research process as it provided invaluable insights into the average internet usage by assessing differences in mean rank between two independent populations: those in urban settings and those residing in rural locations. The research implications necessitated an understanding of whether the average number of internet users in urban households was significantly greater than in rural households (Sak & Yavuzyiğit, 2023). The analytical assessment spanned over a period of three years, encapsulating and juxtaposing data from different temporal snapshots to understand the evolving dynamics better.

Upon the execution of the Kruskal-Wallis test, the outcome was evident in the revealing p-value (significance level), which was 0.000. The findings are consolidated in a tabulated form for comprehendible representation, as seen in Table 3. Technically, the low p-value indicates the probability that the observed data arose purely by chance is exceptionally low. It substantiates our alternate hypothesis one (H1), suggesting a statistically significant disparity between urban and rural households' average internet usage. The proposed hypothesis, thus, gets accepted, tipping the scale towards an evident observation, urban household internet usage is considerably more than rural counterparts.

Table 3. Results of the Kruskal-Wallis Test

No	Year		Kruskal-Wallis Statistic Value	p-value (Sig)	Primary Conclusion
	2019-2021	000	142.702	.000	Alternative Hypothesis (H1) is accepted

Source: Compiled from Appendix 2

Following the conclusion drawn from the Kruskal-Wallis test, the next trajectory was to test our second hypothesis (H2). The chosen pathway for this investigation was through the Wilcoxon Signed Ranks Test, chosen for its practicality when dealing with two categories of data. For our research, these categories of data were based on the year (2019, 2020, and 2021) and the area categories, which were segmented into 'Urban' and 'Village'.

The consequential findings obtained from the Wilcoxon Signed Ranks Test are organized in Table 4. The results indicated a p-value of 0.000 in both categories of data: 'Year' and 'Area'. A low p-value insinuates that our observed sample outcomes are not a product of mere chance occurrences, thus implying statistical significance and the subsequent acceptance of the alternative hypothesis (H2). The outcome signifies that significant changes have occurred in internet usage over the three years in both urban and rural areas.

Table 4. Results of the Wilcoxon Signed Ranks Test

No	Data Category		Wilcoxon Statistic Value (Z)	p-value (Sig)	Primary Conclusion
	Year	000	-12.263	.000	Alternative Hypothesis (H2) is accepted
	Area	000	-12.263	.000	Alternative Hypothesis (H2) is accepted

Source: Compiled from Appendix 3

Investigating such a myriad of data by utilizing these reliable and time-tested tests broadens our understanding of a significant social phenomenon – evolving internet usage patterns. As we proceed further with this meticulous sequel of procedural analysis, each calculated step helps uncover crucial societal structures related to digital accessibility, thereby fostering a robust endowment for data-driven policy formulation.

5. DISCUSSION

Having undergone rigorous testing for both hypothesis one (H1) and hypothesis two (H2), the empirical data reveals that both hypotheses hold water and will be accepted within the framework of this research. The research findings show a clear disparity in internet use, with urban households substantially outstripping their rural counterparts in this respect. Moreover, upon examining each year based on urban and rural areas, distinct differences further come to light. Evidently, the pandemic era has had a colossal impact on the patterns of internet usage, given that many people were compelled to switch to remote working and handling paperwork electronically, all reliant on robust internet connectivity (Worden & Hambly, 2022).

The results of this research resonate with the work of several scholars in the field, including Whitacre and Mills (2007), Mora-Rivera and García-Mora (2021), Chang et al. (2016), and Furuholt and Kristiansen (2007), who have similarly explored patterns of internet use in urban and rural settings. The marked disparity in usage is largely due to significant differences in infrastructure, urban areas generally boasting superior resources, and confirms that most global business activities continue to be concentrated within the confines of large urban centers.

Against this backdrop, it is hardly surprising that internet technology development and access are markedly more prevalent in urban areas, resulting in a larger proportion of users hailing from these locales.

From a historical viewpoint, this disparity in internet use could be seen as a reflection of the proportion of power, influence, and resources held by urban areas vis-a-vis their rural counterparts (Borowski & Stathopoulos, 2023; Yuen et al., 2024).

Simultaneously, the study illuminates distinctive variances in internet usage patterns over the years, both in rural and urban sectors. Factors precipitating these discrepancies primarily include continuous advancements in technology, especially within the context of the Fourth Industrial Revolution. This era has seen the rise of Artificial Intelligence (AI), revolutionizing and reshaping the landscape of internet technology, extending from 4G to 5G and anticipated 6G generations and beyond (Ali Imron, 2021; Mullick & Patnaik, 2022).

Given the paradigm shift towards AI and integrated technological frameworks, it is reasonable to expect that these differences in urban and rural internet usage will grow even more pronounced unless steps are taken to bridge this digital divide. However, it is critically necessary to consider the real-world implications of these findings, particularly regarding efforts to bridge gaps and foster equal opportunities (Kent et al., 2022).

Ultimately, the results of this research present compelling evidence of latent digital inequalities, reliant on geographical location and compounded by time or era. These insights underscore the imperative of focused efforts dedicated to building robust, inclusive digital infrastructures, accommodating of a broader user base spanning across both urban and rural landscapes. As the world continues to grapple with the COVID-19 pandemic and beyond, internet connectivity becomes an instrumental lifeline enabling community flourishing, making it more important than ever to strive towards digital inclusivity and equality (Arin et al., 2022; Pesci et al., 2023).

6. CONCLUSION

This study primarily aimed to examine and juxtapose the patterns of internet usage between urban and rural households across two significant points in time, before and during the pandemic. As we delved into the complexities of this subject, some enlightening realities surfaced, outlining a rich canvas of insights into the trajectory of digital divide and connectivity in the contemporary world.

Painting a vivid picture from the statistical narratives that unfolded through our rigorous analyses, we discovered a pronounced disparity in internet usage across urban and rural households. Urban areas saw a remarkably higher rate of internet usage when compared to their rural counterparts. This discovery echoes the prevailing digital divide often reported in the context of infrastructure and access to digital resources.

Studying the data further, we also observed a striking influence of annual increments on internet usage rates in both rural and urban settings. The patterns indicated that with the progression of years, an uptick in internet usage was noticeable, mirroring society's growing inclination towards digitization across various aspects of daily life. This inference hinted at the role of infrastructural developments in the field of digital connectivity, contributing to the upswing in internet usage across the board.

Moreover, the conclusion turns interesting when noted the impact of an unexpected variable, the onset of the global pandemic, on the trends of internet penetration. In this era characterized by necessary social distancing and remote operations, the world rapidly transitioned into a work-from-home setup, ideally operable with robust digital tools and internet connections.

Interestingly, this shift was not just confined to professional settings. The sphere of education, commerce, entertainment, health, and social interactions, all these moved largely online, benching the conventional modes. Consequently, it catalyzed a significant surge in internet usage rates, drawing many households, urban and rural, under the ambit of digital connectivity.

Nonetheless, the upswing wasn't identical across rural and urban strata. The pandemic-induced digital transition exacerbated the divergence in internet usage between urban and rural households, revealing the stark digital divide that exists. It underscored the pressing necessity for policies and interventions focused on expanding digital access consistently across geographical divides.

In summary, our research imparts critical knowledge about the contours of internet access in urban and rural households, particularly in the context of a significant global event such as the pandemic. It emphasizes the digital divide that exists and the need for appropriate measures to improve internet access, especially given how indispensable the digital world has become to our everyday lives. This comparative study, hence, contributes vital empirical evidence and insights to support and inform strategic policymaking in bridging the digital divide and advancing connectivity for all.

7. SUGGESTION

As gleaned from the research tests, infrastructural development in both rural and urban landscapes is subjected to yearly modifications and improvements. An extrapolation of the current data movements anticipates a converging point in infrastructural progresses between urban and rural areas in the coming

years. Consequently, forthcoming research should cement this area of focus, the increasing potential for the epicenter of internet infrastructure development to manoeuvre towards rural territories.

This pending shift could induce significant alterations in the distribution of internet users among households across the landscape. The potential locational shift could, in turn, wield a profound influence in fostering opportunities for business advancements and economic progress. Substantiating these possibilities necessitates a detailed and specific monitoring mechanism to track the dynamics of internet infrastructure. Leveraging extensive data and analytic capabilities, this monitoring would facilitate a comprehensive and up-to-date understanding of emerging trends and potential shifts, ultimately enabling forward-thinking decision-making and effective, evidence-based policies.

In an age increasingly reliant on digital connectivity, all communities, regardless of their geographical location, must be equipped to participate in and benefit from the digital revolution, thereby ensuring economic resilience and sustainable growth in the coming years. Our research hopes to contribute to this vital objective by shedding light on the current patterns and prospective trajectories of digital inclusivity.

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APPENDIX 1

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Year	N	Percent	N	Percent	N	Percent
URBAN	2019	33	97.1%	1	2.9%	34	100.0%
	2020	34	97.1%	1	2.9%	35	100.0%
	2021	33	97.1%	1	2.9%	34	100.0%
RURAL	2019	33	97.1%	1	2.9%	34	100.0%
	2020	34	97.1%	1	2.9%	35	100.0%
	2021	33	97.1%	1	2.9%	34	100.0%

Descriptives

	Year			Statistic	Std. Error
URBAN	2019	Mean		83.3845	.67735
		95% Confidence Interval for Mean	Lower Bound	82.0048	
			Upper Bound	84.7643	
		5% Trimmed Mean		83.5338	
		Median		83.3000	
		Variance		15.141	
		Std. Deviation		3.89109	
		Minimum		73.74	
		Maximum		90.39	
		Range		16.65	

		Interquartile Range		4.89	
		Skewness		-.513	.409
		Kurtosis		.508	.798
	2020	Mean		86.9456	.61822
		95% Confidence Interval for Mean	Lower Bound	85.6878	
			Upper Bound	88.2034	
		5% Trimmed Mean		87.0702	
		Median		87.3550	
		Variance		12.995	
		Std. Deviation		3.60483	
		Minimum		76.95	
		Maximum		93.08	
		Range		16.13	
		Interquartile Range		5.56	
		Skewness		-.555	.403
		Kurtosis		.388	.788
	2021	Mean		89.2930	.53788
		95% Confidence Interval for Mean	Lower Bound	88.1974	
			Upper Bound	90.3886	
		5% Trimmed Mean		89.4371	
		Median		89.6100	
		Variance		9.547	
		Std. Deviation		3.08986	
		Minimum		79.53	
		Maximum		95.21	
		Range		15.68	
		Interquartile Range		3.72	
		Skewness		-.954	.409
		Kurtosis		2.009	.798
RURAL	2019	Mean		59.0218	2.01729
		95% Confidence Interval for Mean	Lower Bound	54.9127	
			Upper Bound	63.1309	
		5% Trimmed Mean		60.1358	
		Median		62.5200	
		Variance		134.292	
		Std. Deviation		11.58843	
		Minimum		14.35	
		Maximum		74.38	
		Range		60.03	
		Interquartile Range		9.94	
		Skewness		-2.100	.409
		Kurtosis		6.097	.798
	2020	Mean		65.4953	1.92138
		95% Confidence Interval for Mean	Lower Bound	61.5862	
			Upper Bound	69.4044	
		5% Trimmed Mean		66.8147	
		Median		68.1300	
		Variance		125.518	
		Std. Deviation		11.20349	
		Minimum		18.21	
		Maximum		77.46	
		Range		59.25	
		Interquartile Range		9.21	

		Skewness	-2.597	.403
		Kurtosis	9.029	.788
	2021	Mean	72.2630	1.99912
		95% Confidence Interval for Mean Lower Bound	68.1910	
		95% Confidence Interval for Mean Upper Bound	76.3351	
		5% Trimmed Mean	73.7819	
		Median	74.9600	
		Variance	131.883	
		Std. Deviation	11.48405	
		Minimum	16.67	
		Maximum	83.40	
		Range	66.73	
		Interquartile Range	5.74	
		Skewness	-3.775	.409
		Kurtosis	17.617	.798

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Year	Statistic	df	Sig.	Statistic	df	Sig.
AREA	2019	.163	66	.000	.897	66	.000
	2020	.140	68	.002	.881	68	.000
	2021	.133	66	.006	.788	66	.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
AREA	.111	200	.000	.882	200	.000

a. Lilliefors Significance Correction

APPENDIX 2

Ranks

	AREA	N	Mean Rank
AREA	Urban	100	149.39
	Rural	100	51.61
	Total	200	

Test Statistics[a,b]

	AREA
Kruskal-Wallis H	142.702
df	1
Asymp. Sig.	.000

a. Kruskal Wallis Test
b. Grouping Variable: AREA

APPENDIX 3

Ranks

		N	Mean Rank	Sum of Ranks
Year - AREA	Negative Ranks	200[a]	100.50	20100.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	200		
Urban and Rural - AREA	Negative Ranks	200[d]	100.50	20100.00
	Positive Ranks	0[e]	.00	.00
	Ties	0[f]		

Total	200		

a. year < AREA
b. Year > AREA
c. Year = AREA
d. Urban and Rural < AREA
e. Urban and Rural > AREA
f. Urban and Rural = AREA

Test Statistics

	Year - AREA	Urban and Rural - AREA
Z	-12.263[b]	-12.263[b]
Asymp. Sig. (2-tailed)	.000	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.