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Effectiveness of the use of various digital applications to promote public health in Indonesia: A study of the impact of technology on public health

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ABSTRACT

This study was conducted to gain an in-depth understanding of what and how effective the use of digital applications to promote public health is due to the increasingly powerful impact of technology, including public health. This elephant utilizes the data we search electronically on compounds of health publications and technologies released between 2010 and 2022. We examine them under a biological approach that involves a series of techniques such as coding the data, evaluating the data thoroughly, and approaching conclusions so that we will get answers. Finally, digital applications to promote public health, especially in Indonesia, are a non-negotiable necessity, considering the effectiveness and innovation provided by technology that can complete health tasks that have been carried out manually. These findings will be helpful for further studies.

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INTRODUCTION

Digital Health is a set of tools that can limit when and how Google Nest or Home speakers and displays are used. This feature may only be available in certain countries, regions, or languages (Fleming et al., 2019). With Digital Health, people get control and features depending on their activity; relaxing, working, or simply monitoring their phone usage. To find Digital Health as an app, open the Settings app, then turn on Show icons in the list of apps. When people first open Digital Health, medics must set up a profile. On the phone, open the Settings app; and tap Digital Health & parental controls (Kerkhof et al., 2019). Applications are generally used to control hardware devices (which are often referred to as device drivers), perform computations, and

interact with other more basic applications (such as operating systems and programming languages). For example, during the global spread of COVID-19, there was scientific health information and publications that used sophisticated approaches such as genomics and other precision medical tools such as big data, digital devices that can be used to detect specific diseases using specific methods, and other healthy digital tools in surveillance, monitoring, and epidemiological investigation. The gadget will add value to the traditional health approach by utilizing new technologies. As a result, this paper aimed to examine the efficacy of digital apps for public health promotion in Indonesian public health (Tolley et al., 2016).

We have previously written about the rise of genomics and other precision health technologies as disease prevention and treatment tools. We frequently emphasized the need for careful implementation to improve population health and the evaluation of evidence regarding the validity and utility of technologies before widespread implementation (Tung et al., 2018). The promise of digital tools during a pandemic and some of the ethical and societal issues that need to be addressed to make their promise for precision public health a reality in the long run, are the subject of two recent commentaries published in Nature Medicine. First commentary examine the possibility of supplementing two conventional public health approaches for addressing COVID-19 with the use of four related digital technologies, namely the Internet of Things (Firouzi et al., 2021) big-data analytics, artificial intelligence, and blockchain; (1) observing, observation, location, and anticipation of Coronavirus; and (2) reducing the effect on healthcare. The authors provided examples of how the Internet of Things can serve as a platform for public health agencies to access data for COVID-19 monitoring. These include live updates and real-time tracking in numerous international online databases (Mohd Aman et al., 2021).

In addition, big data can present opportunities for modeling studies of viral transmission and directing policies to enhance preparedness more quickly. Models of disease activity, potential growth, and areas of spread, as well as models of countries' preparedness and vulnerability to an outbreak, are two examples (Campbell, 2014). Also, advanced innovation can upgrade general well-being schooling and correspondence messages. The COVID-19 Task Force and Apple, Inc. created an app in the United States that advises the CDC on social isolation and self-isolation, how to monitor symptoms closely, what tests to get, and when to see a doctor. Additionally, Artificial Intelligence and machine learning can potentially enhance COVID-19 diagnosis and detection (Chen & See, 2020). In addition to making it easier to discover new COVID-19 therapies or vaccines, algorithms can be developed to assist in the severity-based triage of patients in clinical or emergency room settings. It is essential to address the direct effects of COVID-19. Maintaining essential and core medical and public health services is also essential. Digital technologies, for instance, can be used to set up "virtual clinics" that use telemedicine. Triage systems, such as online "chatbots" and phone-based software, can also incorporate AI to alleviate physicians' clinical workloads (Gunasekeran et al., 2021).

The second piece of commentary addresses responsible technology deployment requirements. The authors discussed privacy, public trust, and the need to find best practices to create global standards for responsible data collection and processing. Digital data sources, like mobile phones and other digital devices, can help track new outbreaks, but they also raise privacy and data protection concerns (Link et al., 2014). Ethical data collection methods may require only the minimum data to accomplish a particular public health goal. To put it succinctly, to avoid going too far, controlling pandemics may necessitate extraordinary measures that must be measured and restricted to the scope of the outbreak. The use of digital tools and technologies in public health emergencies must have a solid, established scientific foundation (Di Carlo et al., 2021). In the long run, in order to provide maximum benefit for acute public health response, digital biomarkers and algorithms based on artificial intelligence need to be evaluated for their analytical validity, clinical validity, and utility, just as genomic tests that followed the Human Genome Project continue to be evaluated in this manner. In the end, the way digital tools were used to deal with a significant

global health threat like COVID-19 could be used more effectively for future outbreaks and in other healthcare and public health if they are successfully used and evaluated (Albahri et al., 2021).

Digital health tools have the potential to improve public health and medicine significantly. The use and limitations of digital tools in public health surveillance and their applications to the pandemic response are the subject of two recent systematic scoping reviews (Gunasekeran et al., 2021). Personal wearable devices, body-worn devices, and sensors that can assess health and aid in disease diagnosis and treatment are examples of digital applications in clinical practice. Wearable devices allow for continuous measurements and tracking of a person's pulse rate as well as their level of physical activity. We discussed how, despite their potential, most new digital tools still need to be ready for routine clinical applications and require more thorough testing than a recent blog (Gasser et al., 2020). Digital techniques, including internet-based platforms, social media, machine learning, and predictive analytics, have the potential to improve public health surveillance and response. Digital data might allow for more exact segmentation of population health data based on time, place, and individual attributes, thereby improving "precision" in public health response. Because internet access and social media are increasingly commonplace, digital data may be utilized to understand illness prevalence and patterns better and follow the effects of policies and recommendations on health (Bauer et al., 2014).

Digital technologies and approaches have recently been deployed in the public health response to the COVID-19 outbreak. These technologies and tools apply to the use of geospatial tracking of populations during disease outbreaks, providing local and near-real-time information (such as contract tracing) to aid in recognition of an outbreak and population-based clustering of behavioral risk factors such as inactivity, substance use, and poor diet (Budd et al., 2020). The technology has typically been adopted swiftly to obtain more precise and deidentified population-level data regarding the occurrence, spread, risk factors, morbidity, mortality, mobility, contact tracking, lockdown effectiveness, vaccine distribution, and negative impacts. As a result, evaluations, and research on digital technologies in public health are now being conducted. The term "public health" refers to.

In many articles, Abad et al., (2022) conducted a systematic scoping review of digital public health surveillance (DPHS). The authors evaluated 755 articles from the previous 15 years. The studies utilized 26 digital platforms related to 16 public health surveillance themes in 54 nations; most subjects were infectious diseases, followed by behavioral risk factors less frequently. There were a lot of methodological and practical limitations that could prevent DPHS from being integrated into more conventional public health activities, according to the review, as well as a need for longitudinal studies (Abad et al., 2022). The authors point to limitations in the data on the segment attributes of web clients and the fact that many examinations did not separate by geographic area. They describe nine areas in which the included studies typically had significant limitations (Mackey et al., 2020): 1) Forty-one percent of the studies used biased or unrepresentative populations. 2) Thirty-six percent should have segmented results by geographic location. 3) Forty percent had a limited sample size and scope. 4) Eighty percent may have had a content bias. 5) None evaluated health issues in vulnerable populations.

The use of DPHS in public health programs was only described in six studies, which is not surprising. Throughout the review, numerous inquiries have been made regarding the validity and generalizability of internet and social media data. The authors mentioned that client-produced content frequently contains much noise, making it difficult to distinguish data from free-text information and arrange it (Sun et al., 2020). Additionally, they raised concerns regarding the accuracy of health-related digital data and the potential public impact of misinformation, such as a vaccine- or disease-specific information (Tsai et al., 2022).

The two assessments emphasize the weaknesses of digital health technology in public health. Significant barriers exist to its acceptance, scaling, and integration with healthcare systems and public health programs (Testa et al., 2022). Other factors to consider are the likelihood of

measurement bias, particularly for racial and ethnic minority groups—bias caused by unvalidated AI algorithms—and equity concerns when deploying such technology among disproportionately impacted communities. The studies underline the critical need for more study into the utility and trustworthiness of digital platforms, including AI and predictive analytics technologies. Finally, relatively few researchers have looked into the attitudes of healthcare practitioners and patients regarding digital tools. This highlights the need for further participatory research to enhance the frequency with which these strategies are used in the aftermath of the epidemic (Behera et al., 2018). Our office focuses on digital public health apps that aid clinical and public health academics and practitioners. Our online searchable database (PHGKB), which comprises curated articles, highlights current genomics and precision health papers. It is kept up to date. Furthermore, our COVID-19 GPH site provides a ready-to-use resource for remaining current on the most recent genomes and precision health knowledge pertinent to the pandemic. We want to hear from our readers about how digital tools may be used in precision public health (Chang et al., 2021).

Access to various health-related information has increased due to the rapid development of information and communication technology. Users can now create and distribute content online in a more participatory environment thanks to the Web 4.0 revolution (Chib, 2010). Digital health (utilization of digital technology in health services, health promotion, and a variety of other health-related goals using e-health terminology, m-health, connected health, to public health 4.0 and other platforms have also emerged as a result of the digital era's technological foundation. Additionally, this has resulted in significant shifts in the field of health promotion. As of now, computerized well-being advancement ought to be used to develop general well-being further. The digital platform is now a new way to communicate and promote health. It is not just a way to find health information; it is also a way to interact with people whose health issues are similar to people. In order to improve the quality of their health, users receive additional information and social support (Choudhury & De, 2014).

Over half of adults use the internet to find information about their health. Over 70% of teenagers and young adults now use social media as a primary source of information (Korda & Itani, 2013). The real impact of digital-based health promotion has been demonstrated by research on internet-based interventions for weight loss, smoking cessation, and physical activity promotion. According to several meta-analyses, these interventions improve health status, knowledge, behavior, and social support. However, health promotion in the digital age faces several social, ethical, and regulatory obstacles. Health promoters have to work harder because of the borderless nature of the digital world, not only to find the most effective model for changing behavior but also to devise a plan to persuade everyone that digital health promotion should be accepted as a part of good habits to improve public health status, which the government supports. Therefore, based on the above rationalization, we would review more evidence to understand the effectiveness of using digital applications to promote public health services and sustainability in Indonesian health content (Hermansyah et al., 2016).

RESEARCH METHOD

To complete the discussion of the paper, which aims to gain an understanding supported by scientific evidence about the effectiveness of using digital applications to promote public health in Indonesia (van der Tempel et al., 2016). For this reason, we have conducted a series of online data searches on many publications in the form of books and journals released 12 years ago. We are targeting a publication released 12 months ago, considering this last decade has changed technological developments and transformations in health services, especially for the Community (Mosa et al., 2012). In analyzing data that can answer problems with the principle of high validity and reality, a series of studies involving in-depth evaluation data coding techniques draw conclusions that begin with high interpretations of the data so that the data answers the problem.

This study fully gets secondary data from visiting search data with Google scholar and Google Search by installing keywords such as digital applications, public health promotion, technology impact studies, and others (Liang, 2020). Through a study of the data and several publications in the form of evidence that supports this kingdom, we can understand what we do under the phenomenological approach, an approach that tries to get an understanding of something phenomenal from several data that is instead labeled in publications that we can get online. This is a brief step-by-step explanation of the implementation of the study, in which we began with the formulation of several problem words, followed by data search and analysis. Finally, we summarized the data and presented a report under a descriptive qualitative study. While the final report, we report in a systematic design review of simple steps where we want to understand the various digital applications used to promote public health (Hallsworth et al., 2021).

RESULTS AND DISCUSSIONS

Digital work for human health

Mobile health, health information technology, wearables, telehealth and telemedicine, and customized medicine are all included in the broad area of digital health (Ronquillo & Zuckerman, 2017). Digital technology has inspired a revolution in healthcare, from mobile medical applications and software that assist clinicians in making everyday clinical choices to artificial intelligence and machine learning. Digital medical technologies can potentially improve individual healthcare delivery and our capacity to identify and cure diseases correctly. In digital healthcare technology, computing systems, networking, software, and sensors are utilized for healthcare and related applications. This technology has several uses, including medical devices and general healthcare. They include technology designed to be employed in medical products, such as companion diagnostics or pieces of other medical products (like devices, drugs, and biologics). They may also be used in product research or development (Philip et al., 2011).

The benefits of digital health technologies

Through data access, digital tools offer healthcare practitioners a complete picture of a patient's health and allow people more control over their health (Slevin et al., 2019). Digital health has the potential to improve medical outcomes and efficiency significantly. These technologies can help consumers make better health decisions by providing new alternatives for assisting prevention, early detection of life-threatening illnesses, and managing chronic disorders outside of traditional healthcare settings. Stakeholders and providers are utilizing digital health technology. Reduce inefficiencies to tailor medicine for patients while lowering costs and improving access and quality (Schofield et al., 2019). Digital health technology can help patients, and customers better manage and track their health and wellness-related activities.

Furthermore, technology such as cell phones, social networks, and internet apps is changing how we interact (Linn & Koo, 2020). They also make more information accessible and enable new techniques to monitor our health and well-being. These advancements result in greater convergence of people, information, technology, and connection, which improves health care and results. Digital health and the Food and Drug Administration, Many medical devices can connect to other systems or devices and communicate with them. Devices already cleared, authorized, or approved by the FDA are getting digital features added (Awad et al., 2021). Since some devices already have these features, new designs are being considered. Assertions regarding the safety of prescription drugs, patients, medical professionals, researchers, established companies in the medical device industry, and companies that are new to the FDA's regulatory requirements, like mobile application developers, are all stakeholders in digital health activities (Ronquillo & Zuckerman, 2017). Some critics believe that the FDA tends to overlook safety concerns when

approving new medications and to delay withdrawing medications that have been approved once evidence indicates that they are unsafe. These advancements and the integration of medical devices with consumer technology and connectivity excite the FDA's Center for Devices and Radiological Health (CDRH). Utilizing practical strategies that strike a balance between benefits and risks, the FDA has been working to clarify the following digital health topics (Fleming et al., 2019).

The Food and Drug Administration (FDA) asserts that digital health technologies aid providers in reducing inefficiencies, enhancing accessibility, lowering costs, enhancing quality, and personalizing medication for patients. The FDA has made some pretty big mistakes that have caused damage that cannot be fixed and even killed people. The FDA made a few disastrous mistakes that allowed dangerous drugs to enter the market. The FDA has not approved perfume, makeup, moisturizers, shampoos, hair dyes, shaving cream, and face and body wash (Ronquillo & Zuckerman, 2017).

Digital technology in public health during the pandemic

With the global spread of COVID-19, there has been a flurry of scientific information and publications that employ novel surveillance and epidemiologic investigation methods like genomics and precision health tools like big data, wearables, and digital devices (Hartt, 2021). We have previously written about the rise of genomics and other precision health technologies as disease prevention and treatment tools. We frequently emphasized the need for careful implementation to improve population health and the evaluation of evidence regarding the validity and utility of technologies before widespread implementation. The subjects of two recent commentaries published in Nature Medicine are the promise of digital tools during a pandemic and some ethical and societal issues that need to be addressed to make their promise for precision public health a reality in the long run (Galindo et al., 2020). At first, commentary investigates the possible use of four related advanced innovations (i.e., the IoT (web of things), superb information examination, artificial intelligence (computerized reasoning), and blockchain) to expand two conventional general well-being approaches for tending to Coronavirus: (1) COVID-19 surveillance, surveillance, detection, and prevention; and (2) reducing the effect on healthcare. The authors provided examples of how the Internet of Things can serve as a platform for public health agencies to access data for COVID-19 monitoring. These include live updates and real-time tracking in several international online databases (Krausz et al., 2020).

Furthermore, big data can provide the potential for modeling viral transmission research and guiding policies to improve readiness more swiftly. Two examples include models of disease activity, potential growth, and regions of dissemination, as well as models of countries' readiness and vulnerability to an outbreak (Wang et al., 2014). Digital technology can also potentially improve public health communication and education initiatives. The COVID-19 Task Force and Apple, Inc. created an app in the United States that advises the CDC on social isolation and self-isolation, how to monitor symptoms closely, what tests to get, and when to see a doctor. Additionally, AI and machine learning can potentially enhance COVID-19 diagnosis and detection. In addition to making it easier to discover new COVID-19 therapies or vaccines, algorithms can be developed to assist in the severity-based triage of patients in clinical or emergency room settings (Syrowatka et al., 2021).

It is essential to address the direct effects of COVID-19. Maintaining essential and core medical and public health services is also essential. Digital technologies, for instance, can be used to set up "virtual clinics" that use telemedicine. Triage systems, such as online "chatbots" and phone-based software, can also incorporate AI to alleviate physicians' clinical workload (Organization, 2020).

The second piece of commentary addresses responsible technology deployment requirements. The authors discussed privacy, public trust, and the need to find best practices to create global standards for responsible data collection and processing. Digital data sources, like mobile phones and other digital devices, can help track new outbreaks, but they also raise privacy and data

protection concerns. Ethical data collection methods may require only the minimum data to accomplish a particular public health goal. To put it succinctly, to avoid going too far, controlling pandemics may necessitate unusual measures that must be measured and restricted to the scope of the outbreak (Bozkurt et al., 2020).

The use of digital tools and technologies in public health emergencies must have a solid, established scientific foundation. In the long run, in order to provide maximum benefit for acute public health response, digital biomarkers and algorithms based on artificial intelligence need to be evaluated for their analytical validity, clinical validity, and utility, just as genomic tests that followed the Human Genome Project continue to be evaluated in this manner (Di Carlo et al., 2021). In the end, the way digital tools were used to deal with a significant global health threat like COVID-19 could be used more effectively for future outbreaks and in other healthcare and public health if they are successfully used and evaluated (Budd et al., 2020).

CONCLUSION

Ending this study, we want to reiterate that we conducted this study to understand the effectiveness of using digital applications for public health promotion in Indonesia. Recently, along with the emergence of technology for all human interests, especially in the fields of education and health, many studies have been submitted that the application of digital technology with one of the technologies used in the world of health is because technology can work to help humans achieve something very fantastic. From a series of studies, the effectiveness of using digital applications for the public health sector is indeed one of the imperatives, which is the impact of technology on public health. As for what we have succeeded in getting, we have understood how digital works to help human health. So digital health is very innovative and can help humans provide information and communicate to help carry out health tasks with all the platforms created.

Furthermore, quite a lot of hypocrites have been obtained from the use of health technology. Therefore digital surgery is a breakthrough and technological leap to help humans in modern times. Next, we also get digital technology in public health services during the pandemic. This indicates that technology has helped humans a lot, especially in preventing pandemics and other diseases that would be very limited without human technology. Thus, we have summarized several data and facts from the electronic search. We recognize this finding to have many weaknesses and shortcomings. Therefore we welcome constructive criticism and constructive input and the improvement of health and technology research work in the future.

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