Editorial

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FROM COVID-19 TO PATIENT SAFETY: PRACTICE IN INDONESIA

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The December 2022 edition of the Indonesian health administration journal has been published. This time raised several topics about health system. Generally, the manuscripts submitted raise topics related to the issue of Covid-19. Other topics include access to health services, management programs, health insurance, and patient safety.

Another topic of this edition also raises the issue of access to health services. Ainy *et al.* (2022) The issue of Covid-19 is still a concern for researchers at this time. Covid-19 inspection services are still a necessity at this time. However, not all districts can prepare for this need. Imaniar and Widiyanti (2022) reports that the availability of RT-PCR in Covid-19 tests is still limited at the district level. Since Covid-19, the use of online-based systems has increased. Murima *et al.* (2022) reported that the use of telemedicine in health facilities during a pandemic greatly helped health service providers, but there were obstacles such as not being multidisciplinary and lack of knowledge in using technology. On the other hand, Algifnita, Prastyo and Wittiarika (2022) also examined the use of telehealth by midwives in providing their services after the pandemic. Telehealth provides many benefits and impacts. A study conducted by Fathurahman, Basri and Belgiawan (2022) reports several factors that influence the intention to adopt telehealth, namely effort expectations, social influence, facilitating conditions, self-efficacy, and technology anxiety. Apart from that, in terms of education, online programs during Covid have helped the teaching process, but online programs have weaknesses that can reduce the quality of education.

It found that meeting the needs of health services for people with hypertension has not been optimal in Indonesia. In addition, Wulandari *et al.* (2022) reports that there are regional disparities in husbands' support for wives' antenatal care in Eastern Indonesia. Primary infertility women need psychological support in assisting the success of clinical care (Puspitaningrum *et al.*, 2022). The study conducted by Halimah *et al.* (2022) reports various innovations carried out by health service providers at the district level to reduce maternal and infant mortality. Additional findings from this study report that health leadership and financing are also influential in implementing these innovations.

The next topic is health program management. Study by Lestyoningrum, Purwatiningsih and Faisal (2022) reports that team cohesion and trust as a team process have a significant influence on the effectiveness of the TB control team. In addition, Widati *et al.* (2022) found that eight districts/cities in East Java implemented smoke-free regional regulations. Advocacy and communication made it possible for the regulation to be implemented in East Java. Other topics are related to health insurance. A study conducted by Kartinawati *et al.* (2022) reports three things that we can learn from health insurance in the United States, such

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as easy access to health insurance, discounted health fee programs, and cost analysis for paid services in a health facility. Finally, the topic of patient safety. Study Engineer and Dhamanti (2022) states that the leadership's commitment to making safety and quality a priority strategy lays a strong foundation for institutionalizing patient safety. The study topics above show various findings that will later add to the contribution of science in the field of health administration. Happy reading and enjoy the scientific repertoire!.

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Original Research

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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PERCEPTIONS, ATTITUDES, AND PRACTICES OF MIDWIVES TOWARDS THE USE OF TELEHEALTH

Persepsi, Sikap dan Praktik Bidan dalam Pemanfaatan Telehealth

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Abstract

Background: The Covid-19 pandemic has led to the closure of health facilities and a decrease in the usage of contraceptives. Therefore, the government and professional organizations initiated telehealth services to improve the quality of health services and minimize the risk of Covid-19 transmission.
Aims: This study explored the perceptions, attitudes, and usage of telehealth by independent midwives during the Covid-19 pandemic in Surabaya**.**
Methods: This qualitative phenomenology study was conducted from March to April 2021, and it involved independent midwives in Surabaya. The purposive sampling technique was used to select informants, and it obtained seven informants that met the inclusion criteria. Primary data were retrieved through semi-structured in-depth interviews.
Results: This is due to the influence of their age, knowledge, the intensity of previous telehealth use, gaps in technology use, availability of facilities and infrastructure, self-motivation, social support, and efforts to find solutions through telehealth.
Conclusion: Five out of the seven midwives decided to continue using telehealth in their services after the pandemic because of its benefits and impacts. Midwives, professional organizations, and policymakers need to consider the use of telehealth to improve the future services

Keywords: Covid-19, decision making, health policy, telehealth.

Abstrak

Latar belakang: *Pandemi Covid-19 berdampak pada penutupan beberapa fasilitas kesehatan dan penurunan angka penggunaan kontrasepsi. Oleh karenanya, pemerintah dan organisasi profesi menginisiasi layanan telehealth guna meningkatkan kualitas layanan kesehatan dan meminimalisir risiko penularan.*
Tujuan: *Penelitian ini mengekplorasi persepsi, sikap dan praktik dalam pemanfaatan telehealth oleh bidan praktik mandiri pada pandemi Covid-19 di Surabaya.*
Metode: *Penelitian kualitatif fenomenologi ini dilakukan pada bulan Maret-April 2021 dan melibatkan bidan praktik mandiri di Kota Surabaya. Teknik purposive sampling dipilih untuk menyeleksi informan penelitian, dan diperoleh tujuh informan yang memenuhi kriteria. Pengambilan data primer dilakukan dengan wawancara mendalam semi terstruktur.*
Hasil: *Terdapat pengaruh usia, pengetahuan, intensitas penggunaan telehealth sebelumnya, kesenjangan penggunaan teknologi, tersedianya sarana dan prasarana, motivasi diri, dukungan sosial serta upaya penyelesaian masalah dengan telehealth.*
Kesimpulan : *Terdapat lima dari tujuh bidan memutuskan untuk terus menggunakan telehealth dalam layanan mereka setelah pandemi karena manfaat dan dampaknya. Bidan, organisasi profesi serta pemangku kebijakan perlu mempertimbangkan telehealth untuk meningkatkan pelayanan di masa mendatang*

Kata kunci: Covid-19*, kebijakan kesehatan, pengambilan keputusan, telehealth.*

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Indonesian Journal of Health Administration
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Introduction

During the Covid-19 pandemic, Indonesia's morbidity and mortality rates have drastically increased, and almost all health services in Indonesia have been limited due to their focus on Covid-19 services. Moreover, Indonesia's maternal and child health services have also been negatively affected by the pandemic. Midwives, as independent practitioners, have the role of providing maternal and child health services by providing information, guidance, and motivation to mothers and their families (Ministry of Health RI, 2020b).

The National Population and Family Planning Board (*Badan Kependudukan dan Keluarga Berencana Nasional* or BKKBN) of East Java Province stated that there was an increase in the pregnancy rate by 10% since the start of the pandemic. It was predicted that the increase was due to work from home (WFH) policy that requires all workers to stay at home. East Java Province also had the highest pregnancy rate in the country (Sugiharto and Nurhartanto, 2020). Moreover, the Minister of Women Empowerment and Child Protection (*Pemberdayaan Perempuan dan Perlindungan Anak* or PPPA) explained that the Covid-19 pandemic has also affected women's mental and emotional health where 57% of women experienced increased stress and anxiety due to increased burdens such as childcare, housework, job and income loss, and gender-based violence (MWECP, 2020).

The Indonesian Midwives Association (*Ikatan Bidan Indonesia* or IBI) has also issued service guidelines during the Covid-19 pandemic, which included the development of an information system application that bridges communication between health service facilities, health providers, and patients. In addition, this innovation becomes a platform for counseling, consultation, and education about reproductive health and family planning through smartphones (Indonesian Midwives Association, 2020).

(Galle *et al.*, 2020) found that telehealth allows patients to connect with health providers without the risk of direct contact with Covid-19. Social media has also allowed mothers to gain information from health workers around the world despite the movement restrictions. Therefore, due to the rising use of telehealth, this study investigated the use of telehealth in Indonesia by independent midwives, as well as explored their perceptions, attitudes, and practices towards this innovation during the Covid-19 pandemic.

Method

This qualitative study used a phenomenological approach to gain an understanding of the midwives' perceptions, values, events, norms, opinions, and beliefs (Martha and Kresno, 2016). It was conducted from March to April 2021. The informants were midwives who had independent practices in Surabaya, at least an associate degree, and an active midwife practice license (*Surat Izin Praktik Bidan* or SIPB), and used telemedicine in their services and consultations both in real-time and store-and-forward through social media in their services. The type of telehealth used by informants according to IBI guidelines by using smartphones and messaging applications that are already available such as Whatsapp. They were also selected through purposive sampling.

Primary data were obtained through direct, in-depth interviews that followed semi-structured interview guidelines and used recording devices and notes. The parameters observed were the midwives' perceptions, attitudes, and practices

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.155-164

Table 1. Informants' Data

Code	Age	Work Period	Last Education
IF1	39 years old	14 years	Master degree
IF2	63 years old	39 years	Associate Degree III
IF3	65 years old	44 years	Associate Degree IV
IF4	65 years old	41 years	Associate Degree III
IF5	69 years old	43 years	Master degree
IF6	40 years old	20 years	Master degree
IF7	53 years old	23 years	Associate Degree III

toward the use of telehealth during the Covid-19 pandemic. The data obtained from the interviews were audio recordings that were converted into verbatim transcripts, which were then coded and labeled. The responses to interview questions were then categorized according to themes. Data analysis is done by selecting, focusing, simplifying, and transforming data, triangulating data, presenting data, and drawing conclusions.

The data of prospective informants was obtained from the search for pomegranate midwives, number phone and their addresses on Google Maps. The informant recruitment process was carried out by visiting almost all places and health service centers in Surabaya. Then the sample is selected based on more specific criteria that have been determined by the researcher in order to represent the perspective. A total of seven informants fit the criteria and are willing to conduct in-depth interviews.

This study has received research ethics approval from the Faculty of Medicine, Universitas Airlangga, No.46/KEPK/FKUA/2021. The procedures carried out in stages 1) obtaining permission to collect research data from the Faculty of Medicine, Universitas Airlangga, East Java Indonesian Midwives Association (*Ikatan Bidan Indonesia* or IBI), public health office and primary healthcare centers, 2) research ethics permit, 3) and the list of prospective informants from several parties, 4) selecting prospective participants, 5) distributing informed consent forms with the study's objectives, and providing time for questions and answers, 6) collecting the forms, and 7) scheduling in-depth interviews.

Results and Discussion

A total of seven informants met the research criteria. They ranged in age, education, and length of work. The results of this study were divided into three themes, namely, telehealth for midwives and the influence of telehealth towards midwife services during the Covid-19 pandemic.

All participants were independent midwives and had an average of more than 14 years of experience, and the longest was 44 years (Table 1). All midwives were also involved in Indonesian Midwives Association (*Ikatan Bidan Indonesia* or IBI) as administrators and members. Midwives coded IF5 and IF6 were the facilitators and supervisors of the Surabaya City Delima Midwife Center. Whereas the participants coded, IF6 worked as heads of study programs, lecturers, and writers. Overall, three themes emerged from the analysis, namely descriptions of midwives' independent practices, decision-making factors that affect the usage of telemedicine, and attitudes and practices towards telemedicine use during the Covid-19 pandemic.

Indonesian Journal of Health Administration
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10.20473/jaki.v10i2.2022.155-164

Theme 1: Services in the Midwives' Independent Practices during the Covid-19 Pandemic

Theme 1 describes the midwives' experiences during the Covid-19 pandemic and how the event had a major impact on them and the services provided in their independent practices. The midwives experienced anxiety and fear, and some factors that led to this result are their age, personal health problems such as comorbidities, family and client health, and financial concerns.

> *"For me, it was clear that it was stressful at first pandemic. Everyone's stress levels were high, and there was an extraordinary fear. She wanted to close the practice but we already accepted the previous patient with antenatal are (ANC), so we had to keep it open, but with shortened work hours." (IF4)*

> *"... Making it difficult for the economy, who used to be able to meet children schools can't be face-to-face, online, pregnant people who check up usually every month come and end up being pushed back due to financial problems. For the purposes of checking health alone, it is difficult, let alone to eat." (IF5)*

> *"... for during the pandemic I did not receive maternity assistance. It's been this one year, there's no partus. But still for the ANC, birth control and immunizations still remain." (IF7)*

The statement above indicates how the midwives felt stressed and were indecisive about providing their services during the pandemic. Therefore, they reduced their service hours, eliminated delivery services, and closed their practices at the beginning of the pandemic.

Midwives, as women and frontline health workers, are more vulnerable to mental health problems. Other health problems such as heart and hypertension or depression, genetics, relatives, and environmental factors can also affect their anxiety (Wari, Adiesti and Yuliani, 2020; Munir and Takov, 2021).

During the pandemic, midwives experienced a decrease in the number of client visits, especially for family planning services, as well as an increasing difficulty in the referral process to the nearest facility when complications occur. Hospitals or primary healthcare centers refuse the referral if patients are not accompanied with negative rapid or swab test results.

> *"In the past, there was a 40-year-old Gravida 4 mother, who came to us with a full opening. Then he helped sis, didn't advance. I finally referred the mother to the hospital and it turned out to be positive for Covid. Finally, all our midwives waited from 10am and just got home this morning. Five hospitals didn't want to accept it, so I ended up calling the health care office. At that time, I was not ready to provide rapid tests. That's all my experience at the beginning of the Covid pandemic, I am finally now providing for faster service" (IF2)*

The pandemic causes a challenge for midwives to provide health services. Nevertheless, during the Covid-19 pandemic midwives continued providing their services as they put forward their social function in the society and were able to earn income. When a midwife carries out her duties, she must be responsible for the needs of clients, families, and communities (Sudra, 2021).

> *"We work because of the community's needs, we have to provide contraceptives to the patients, if they don't use it, they will get pregnant, right? Then also the ANC, if we don't serve them, where*

Indonesian Journal of Health Administration
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will they look? Many health centers will be locked down, closed." (IF3)

Midwives are aware of their limitations during midwifery care practices so as to improve their professional abilities, maintain their competence, and remain well informed about the development of science and technology in accordance with decisions (Ministry of Health RI, 2020a).

During the pandemic, midwives would upgrade their knowledge and skills through seminars, training, books, information from the internet, and organizations they joined. The more knowledge and experience midwives have, the more they are able to make better service decisions during the pandemic and in the future. Moreover, research has found that more work experience likely results in better social awareness (Carolan Olah, Kruger and Garvey Graham, 2015).

"…there is a sense of happiness, a sense of satisfaction from helping people. Especially when the mother and the baby are healthy." (IF4)

Success in providing services is one of the motivations for midwives to continue providing midwifery services during the pandemic. In contrast, bad experiences could be used as materials for service evaluation and improvement during the COVID-19 pandemic.

Theme 2: Decision-Making Factors for Utilizing Telehealth

Both internal and external factors could affect the decision-making process. Internal factors include age, length of work, knowledge, education, previous experience, motivation, and health. Meanwhile, external factors include government rules or policies, the environment, time, clients, and social support. The COVID-19 pandemic has changed the situation, and thus the government and the Ministry of Health of Indonesia created health policies to minimize the spread of Covid-19 in all maternal and child healthcare facilities. One of these policies requires midwives to provide consultation, educational counseling, and online remote health monitoring services (Muliati, 2020).

"It's a very good policy because it's profitable, it's also beneficial for me because it also reduces face-to-face contact, and beneficial for the patient too as the cost is cheaper. So, for the client, God willing, it will be more profitable. It is only possible for people who need therapy, it can be beneficial for us or it may not be." (IF5)

The transformation due to the pandemic has caused midwives to decide to use telehealth to meet the needs of their clients.

"...we will continue to provide information to the client so that they can make more informed decisions. I can still provide information and counseling to clients, so there are many supporting factors (for using telehealth)." (IF6)

This is in line with the midwife's duties and authority in making decisions and providing consulting services and/or referrals (Sudra, 2021).

Although telehealth services reduce face-to-face contact, midwives can still establish relationships with their clients and provide quality services (Ministry of Health RI, 2020b). Telehealth can be done anywhere at any time, and it reduces direct contact with patients. Midwifery services with telehealth during the pandemic have received a lot of positive responses and support from clients, their families, and community.

Social support likely becomes an effective and important support system for individuals when they deal with difficult situations and conditions (Labrague and De

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10.20473/jaki.v10i2.2022.155-164

los Santos, 2020). Therefore, positive support is needed for midwives so that they can improve their mental health and remain motivated and confident in carrying out their work during the pandemic.

> *"Fortunately, my network clinic and BPJS sent me medical device help. God... thanks! In my fear of this pandemic, they came to send aid and there was also help from the IBI, UNFPA that's what the Americans got 3 doses. At the end of the day, I've got help, the beginning time is a problem. Personal protective equipment is hard to come by." (IF4)*

Lack of personal protective equipment (PPE) is often associated with higher levels of anxiety and depression (Rodriguez *et al.*, 2020). Therefore, the government and organizations provided and distributed PPE for midwives during the pandemic to reduce their anxieties about the supply of PPE. Thus, a lack of PPE would not be an obstacle for them to continue providing their services.

According to (Daemers *et al.*, 2017), midwives would take into account various preferences and needs of clients. All of the midwives in this study provided telehealth services as they could limit face-to-face contact with the clients, giving them safe and comfortable feelings. Moreover, by using telehealth, midwives would be able to provide their services remotely to their clients and reduce their anxiety.

Additionally, some midwives may have high compliance and motivation in providing their services due to their high awareness of how important their service during the pandemic is (Ariyani *et al.*, 2021).

Theme 3: Midwives' Attitudes and Usage of Telehealth

As service providers and leaders, and midwives should be able to set a good example in their services. Midwives' perceptions, attitudes, and practices towards the use of telehealth may reflect their decision on midwifery services.

> *"First, I don't want to get infected and I don't want to transmit it. I want the pandemic to end quickly. This will happen sooner if we obey health protocols, yes, even if it's telehealth. Yes, we are trying to reduce the number of morbidity and mortality affected by a pandemic like this. We can end the pandemic if we take care of our health, the health of our patients, and the health of our families." (IF4)*

The purpose of providing midwives with telehealth is to ease their access to information, health consultations, health safety between midwives and clients, remote health monitoring, and good administration for an appointment. Midwives play an important role in breaking the chain of Covid-19 transmission in their independent practices. By implementing telehealth, midwives can spend their time more effectively and consult with their clients according to the time upon agreement (Purbaningsih and Hariyanti, 2020).

Midwives' attitudes and practices regarding the use of telehealth are open behaviors that can be seen by others. This study found that the perceptions, attitudes, and practices of midwives were positive toward telehealth use during the pandemic. Midwives implemented telehealth services through WhatsApp before the pandemic. The type of telehealth used by the midwives was synchronous and asynchronous, depending on the needs and urgency of the service. In telehealth services, midwives often use media such as Whatsapp, Zoom, Google Meet, telephone, family planning learning applications, and websites as communication information systems to connect with their clients.

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The challenges that midwives face when providing telehealth are a lack of infrastructure, digital illiteracy, limited remote monitoring, financial barriers, lack of non-verbal feedback, limited bonding, language barriers, and distrust of service providers (Galle *et al.*, 2020). Three informants aged 65 years were baby boomers and over experienced time constraints and a lack of capabilities in using technology. Typically, they are hardworking, optimistic in nature, and work-oriented. Therefore, they are always looking for ways to make changes, are time-oriented, and are eager to learn new things so that their business can keep up with the next generation (Mulyanti, 2021). Moreover, when a new technology arises, they are more willing to accept it after realizing its convenience and potential benefits. Thus, it is important to convey the usefulness and advantages of the technology (Don *et al.*, 2020).

The informants in this study had high enthusiasm, motivation, and desire to learn new things, for example, by utilizing telehealth in their services. However, they had issues with how to operate it; they would ask their work partner or closest person to them to teach them how to use the technology. Researchers have also found that midwives tended to have a leadership style oriented to human relations and compliance with regulations imposed by the government (Mulyanti, 2021).

> *"It is very beneficial for the patient and us. We can reduce encounters. The patient would also be quite satisfied, they can chat for quite a while without any disturbances. If they're here to talk for a long time, someone would be waiting for them (next in line) ..." (IF2)*

> *"The first advantage is that the patient's privacy is better maintained by online. Second, if the patient does not have time or does not have time, it is more effective if it is done with an online consultation as well." (IF1)*

It is believed that midwives tend to have positive responses towards telehealth in that the service has also been very profitable for them. It benefits both parties between patients and midwives, by reducing face-to-face contact and allowing them to provide optimal services at a safe distance (Hajesmaeel-Gohari and Bahaadinbeigy, 2021).

Furthermore, five of the seven midwives decided to continue using telehealth in their services after the pandemic due to its benefits and impacts. This statement indicates that midwives can make decisions responsibly with the ethical use of technology (Astuti, Tajmiati, and Suryani, 2016). Nevertheless, some of the older midwives preferred to return to normal midwifery services (direct services) in their practice after the pandemic.

> *"If we're back to how we used to be, no problem. So, for example, if things are normal, there's no problem with continuing direct services. I think it's just normal, like before when it was time for checks during pregnancy, they would come directly to us if there were complaints, check face-to-face." (IF5)*

The midwives that would not continue to use telehealth in the future stated that telehealth services would reduce their income. It is noted that they had trouble using the technology. Another midwife also said that telehealth has a mediocre effect and will only be used according to the future situation. Nevertheless, perceptions and attitudes are the main factors in decision making and practice, and they can change over time depending on supporting factors.

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Conclusion

There are internal and external factors that influence the use of telehealth by midwives during the pandemic and in the future. The internal factors include age, knowledge, desire to renew abilities, self-motivation, the intensity of previous use of telehealth, gaps in technology literacy, availability of time, and problem-solving effort. In addition, the external factors include the availability of facilities and infrastructure, partner support, client and family support, and environmental support.

It is hoped that all midwives can be more active in finding information and knowledge and implementing telehealth services, professional responsibilities, and philosophy so that they are able to aid the development and advancement of tech-based midwifery services in Indonesia. The government and professional organizations should create a detailed policy about standard guidelines for telehealth use and provide communication and internet access tools evenly throughout Indonesia as telehealth facilities and infrastructure in all health facilities to aid the development of services, especially for maternal and child healthcare services. In addition, the government and professional organizations must provide training in the use of telehealth for midwives periodically in order to form new skills for midwives in the service. Further research regarding this topic needs to be conducted with further in-depth interviews.

Abbreviations

ANC: Antenatal Care; BKKBN: *Badan Kependudukan dan Keluarga Berencana Nasional*; PPE: Personal Protective Equipment; PPPA: *Pemberdayaan Perempuan dan Perlindungan Anak*; IBI: *Ikatan Bidan Indonesia*; SIPB : *Surat Izin Praktik Bidan*.

Declaration

Ethics Approval and Consent Participant

This study has received research ethics approval from the Faculty of Medicine, Universitas Airlangga No.46/KEPK/FKUA/2021.

Conflict of Interest

We declare that we do not conflict with anyone's interest.

Availability of Data and Materials

The availability of data and materials can be accessed based on journal and reader request

Authors' Contribution

AOA conceptualized the study design and article writing and prepared the original draft. BP and IDW directed the preparation of article concepts and article writing.

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Original Research

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IDENTIFYING HEALTHCARE WORKERS' INTENTION TOWARD TELEHEALTH IN INDONESIA DUE TO COVID-19 PANDEMIC

Mengidentifikasi Intensi Tenaga Kesehatan Terhadap Telehealth di Indonesia Akibat Pandemi Covid-19

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Abstract

Background: Healthcare sectors adopted various steps during the Covid-19 pandemic to prevent virus transmission, including limiting patient numbers. Telehealth can be an alternative solution since healthcare institutions can provide services without direct contact.
Aims: This research aims to analyze healthcare workers' intentions in Indonesia toward telehealth using the unified theory of acceptance and use of technology (UTAUT) framework with additional variables.
Methods: A literature review was undertaken to develop a framework tested using Partial Least Square-Structural Equation Modeling (PLS-SEM). This study was conducted with Indonesian healthcare institutions in Bandung and Surakarta. Participants consisted of doctors and nurses.
Results: Of 200 participants, this finding showed effort expectancy, social influence, facilitating conditions, self-efficacy, and technology anxiety influenced the intention to adopt telehealth (p-Value ≤ 0.05). However, performance expectancy and perceived security and data have no significant influence (p-Value > 0.05). This study discovered that performance expectancy is influenced by effort expectancy (β = 0.727), while effort expectancy is influenced by self-efficacy (β = 0.642).
Conclusion: Indonesian healthcare institutions must be concerned with factors affecting telehealth implementation, especially with data security, which has proven insignificant. Further research is required to optimize the application.

Keywords: Covid-19, pandemic, telehealth, UTAUT

Abstrak

Latar Belakang: *Berbagai langkah ditempuh sektor kesehatan selama pandemi Covid-19 untuk mencegah penularan virus, termasuk membatasi jumlah pasien. Telehealth bisa menjadi solusi alternatif karena institusi kesehatan dapat memberikan perawatan medis tanpa kontak langsung.*
Tujuan: *Penelitian ini bertujuan untuk menganalisa niat petugas kesehatan di Indonesia terhadap telehealth menggunakan kerangka teori terpadu penerimaan dan penggunaan teknologi (UTAUT) dengan variabel tambahan.*
Metode: *Tinjauan literatur dilakukan untuk mengembangkan kerangka konseptual yang diuji menggunakan model persamaan struktutal-kuadrat terkecil parsial (PLS-SEM) . Penelitian ini dilakukan dengan institusi kesehatan Indonesia di Bandung dan Surakarta. Peserta terdiri dari dokter dan perawat.*
Hasil: *Dari 200 peserta, temuan ini menunjukkan bahwa ekspektasi upaya, pengaruh sosial, kondisi fasilitasi, efikasi diri, dan kecemasan teknologi berpengaruh terhadap niat untuk mengadopsi telehealth (p-Value 0,05). Namun, harapan kinerja dan keamanan data yang dirasakan tidak memiliki pengaruh yang signifikan (p-Value > 0,05). Penelitian ini juga menemukan bahwa ekspektasi performa dipengaruhi oleh ekspektasi upaya (β = 0,727), sedangkan ekspektasi usaha dipengaruhi oleh efikasi diri (β = 0,642).*
Kesimpulan: *Institusi kesehatan Indonesia harus memperhatikan faktor-faktor yang dapat mempengaruhi implementasi telehealth, terutama terhadap keamanan data pasien yang terbukti tidak signifikan. Penelitian lebih lanjut diperlukan untuk mengoptimalkan pengaplikasian.*

Kata kunci*: Covid-19, pandemi*, telehealth, UTAUT

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Introduction

As the number of Covid-19 patients increases (Ohannessian, Duong and Odone, 2020), many healthcare personnel in several countries struggle to fulfill the demand due to longer working hours than usual, stress, and psychological pressure due to fatigue, etc. However, the health and well-being of healthcare personnel are the core of any well-functioning healthcare system (Moazzami *et al.*, 2020). One of the strategies healthcare providers attempt to implement a physical distancing during the Covid-19 pandemic is limiting patient numbers. Meanwhile, non-Covid-19 patients' service demands must be fulfilled, and reducing patient numbers may result in suboptimal care delivery.

With the increasing demand for healthcare during the pandemic, telehealth was implemented in some countries, including Australia, the UK, and the USA (Fisk, Livingstone and Pit, 2020; Jeganathan *et al.*, 2020). Telehealth is described as how a healthcare system delivers care to patients without seeing them in person (Wosik *et al.*, 2020). This system began with e-health and evolved into telemedicine and telehealth in an electronic-based health service system. It allows patients to connect with healthcare via smartphones or computers. The difference between telemedicine and telehealth is that telemedicine focuses only on clinical services. Meanwhile, telehealth has a broader scope, covering online consultations between patients and healthcare providers at remote healthcare facilities and non-clinical services (Brown-Jackson, 2018).

Telehealth emerges to provide more convenient systems, such as providing access to high-quality care, saving time and cost, and optimizing collaboration between institutions (Zhou *et al.*, 2019). Telehealth has evolved into an essential aspect of the health sector. For example, in 2016, over 60 percent of healthcare institutions in the US adopted telehealth (Tuckson, Edmunds and Hodgkins, 2017). It is a cutting-edge improvement of the existing system, offering benefits such as flexibility, efficiency, and expanding service coverage (Tsai *et al.*, 2019; Jeganathan *et al.*, 2020). A previous study at the Northwell Healthcare system found that over 85 percent of healthcare workers were satisfied with this system (Jeganathan *et al.*, 2020). Healthcare workers felt no significant differences from the existing system and were satisfied. Telehealth can be an alternative strategy during the pandemic since healthcare institutions can assist without direct contact with patients. Although it delivers many benefits, telehealth has several limitations.

All stakeholders must be aware of telehealth limitations, such as a lack of data security or privacy concerns, reduced communication between patients and clinicians, and system failure (Kayyali *et al.*, 2017; Zhou *et al.*, 2019). Other obstacles discovered in the previous study are limited access to remote areas, government support, and system ease of use (Brown-Jackson, 2018; Bhatia, 2021). During the Covid-19 pandemic, healthcare institutions in Indonesia experienced the same burden as previously mentioned in other countries. Therefore, implementing telehealth in Indonesia can provide additional benefits in distributing better health services.

However, research on telehealth adoption in Indonesia is still limited, and the system has not been widely implemented (Cahya, Nugraha and Aknuranda, 2017). Thus, the factors influencing the adoption of telehealth have not been identified. In addition, limitations that have been found in the previous studies may have a different impact on healthcare institutions in Indonesia. For example, aspects such as resources from human or infrastructure,

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.165-176

funds, internet coverage, data security and regulations from healthcare institutions in Indonesia may be different compared to previous studies in other countries. In addition, the existing system used in healthcare institutions in Indonesia also varies. If the current system is considered good enough and adequate to provide services to patients, healthcare workers may use the existing system instead of switching to a new one.

On the other hand, if the current system is deemed not optimal in providing services, the interest of healthcare workers in adopting telehealth may increase. Hence, the limited empirical studies analyzing factors influencing telehealth adoption in Indonesia and its limitations are the ground of this study. This study aims to analyze healthcare workers' intention toward telehealth in Indonesia if telehealth is implemented later as an alternative to assist during a pandemic and endemic situation. This study focused on healthcare workers' perspectives in order to determine which factors can impede the application of telehealth from the internal of healthcare institutions with the purpose that healthcare institutions can optimize these factors to make telehealth application faster, more effective, and more prepared before the system is applied to patients.

This study used the modified unified theory of acceptance and use of technology framework (UTAUT) to determine user acceptance of the new technology and variables that have a significant influence on the intention of healthcare workers since this framework covers the limitations in the application of telehealth. The UTAUT framework was modified by adding three additional exogenous variables from previous studies that influenced the intention to use telehealth. The Partial Least Square-Structural Equation Modeling (PLS-SEM) was used to examine the relationship between endogenous and exogenous variables in the conceptual framework.

Method

The quantitative approach was used to test the conceptual framework developed in this study. A literature review was performed to identify gaps and limitations in past healthcare studies. Existing literature is studied and analyzed to seek a conceptual framework to obtain data or output that will support this research. The survey was conducted with healthcare institutions in West Java (Bandung) and Central Java (Surakarta) in Indonesia, as both cities have implemented telemedicine in their institution, so they are familiar with how telehealth works. This study has obtained permission to conduct a survey on several healthcare institutions in those cities.

The subjects in this study were doctors and nurses who treat patients directly. Other staff who work in healthcare institutions that do not treat patients directly (office staff) are excluded from this study. Participants consisting of doctors and nurses were given all information about the purpose of this study. Two hundreds healthcare workers were willing to participate in this research. This sample size is suitable for the SEM because it met the minimum sample recommendation (Hair *et al.*, 2010). In addition, by using G*Power, the statistical power of 80%, a significance level of 2.5%, and R^2 of 0.5 from the previous study (Binyamin, 2020), the minimum sample size is 29 respondents, or by using R^2 of 0.32 (Fitrianie *et al.*, 2021), the minimum number of respondents needed is increased to 74. A cluster sample was employed using a one-shot case study as the sampling method in this study.

Online surveys consisting of 29 closed-ended questions were distributed to

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.165-176

healthcare workers via email through their institution and WhatsApp chat. The survey was conducted for six months, from April 2021 to September 2021. This study used a 5-point Likert scale with 1 indicating "strongly disagree" to 5 indicating "strongly agree". A total of 29 indicators were used to test the constructs in this study. Each questionnaire was made based on previous research using the UTAUT framework (Venkatesh *et al.*, 2003; Khatun, Palas and Ray, 2017; Van Houwelingen *et al.*, 2018; Binyamin, 2020). The survey results identified limitations that may impact telehealth adoption and which aspects need to be improved later. Potential solutions to optimize this implementation in the future were given based on the results of this study.

The unified theory of acceptance and use of technology (UTAUT) and technology acceptance model (TAM) (Viswanath , Venkatesh and Davis, 2000) are the most commonly used frameworks to predict individual readiness in utilizing new technology (Venkatesh, Thong and Xu, 2012). These theoretical frameworks are frequently applied in healthcare research and show significant effects (Van Houwelingen *et al.*, 2018). Moreover, variables in the model are related to telehealth limitations. However, this study used the UTAUT framework since this framework covered more telehealth limitations than the TAM framework. Therefore, this study uses the modified UTAUT framework to determine which factors influence healthcare workers' intentions towards their intention to use telehealth. This study adds three additional variables influencing the intention toward telehealth in previous studies: perceived security, self-efficacy, and technology anxiety.

The endogenous variable used in this study is the intention to use telehealth (IU). This study used seven exogenous variables, which are performance expectancy, effort expectancy, social influence, facilitating condition, perceived security and data, self-efficacy, and technology anxiety. The first variable is performance expectancy (PE), characterized as the significance of technology's role in providing benefits to users (Venkatesh, Thong and Xu, 2012). Hoque et al. reported that performance expectancy significantly impacts mHealth adoption (Hoque and Sorwar, 2017). In accordance with that result, Binyamin et al. research showed that performance expectancy has an essential role in wearable health monitoring technology for chronic disease patients (Binyamin, 2020).

The second variable is effort expectancy (EE), defined as the level of convenience that people experience when utilizing technology (Venkatesh, Thong and Xu, 2012). Effort expectancy and performance expectancy were found to significantly affect the adoption of new technologies in previous studies (Van Houwelingen *et al.*, 2018). Effort expectancy can represent the suitability of utilizing and implementing technology in daily activities. Social influence (SI) is the third variable with the definition as the degree to which a person believes that important people in their life believe they must use the system (Venkatesh *et al.*, 2003). According to the previous study, social influence is a significant indicator of the intention to use mHealth technology in older adult patients (Cajita *et al.*, 2017).

The facilitating condition (FC) is described as an individual's or customer's perception of the resource and infrastructure available to assist the technology's implementation (Venkatesh *et al.*, 2003). A previous study found that facilitating conditions influence the intention to use m-health in their research on m-

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.165-176

health using the UTAUT model (Khatun, Palas and Ray, 2017). The perceived security and data (PS) variable was used because this variable is one of the most critical aspects of implementing a telemedicine system: data privacy and security (Bokolo, 2020). Healthcare institutions have a big responsibility regarding the security of patient data and their internal data. A previous study reported that older people's motivation to use telehealth is influenced by perceived security and data (Van Houwelingen *et al.*, 2018).

The sixth exogenous variable, self-efficacy (SE), is defined as the user's ability to execute work or tasks using technology (Venkatesh *et al.*, 2003). Fitrianie et al. found that self-efficacy is essential in influencing the user's behavioral intention (Fitrianie *et al.*, 2021). On the other hand, self-efficacy also predicted effort expectancy in surveys in understanding older people's readiness to accept telehealth (Van Houwelingen *et al.*, 2018). Last, the exogenous variable used is technology anxiety (TA), with the terms coming from "computer anxiety" described as "the emerging of emotional or anxious responses from the person when utilizing technology" (Venkatesh *et al.*, 2003). The findings of Tsai et al. indicate that technology anxiety influences telehealth adoption intention in Taiwan (Tsai *et al.*, 2019).

In addition, this study analyzed relationships between exogenous variables, which are EE on PE, SE on EE (Van Houwelingen *et al.*, 2018), and proves there is no relationship between TA and EE (Tsai *et al.*, 2019). The use of Cronbach alpha in this study is to check the reliability of each construct from the framework. The pilot test analysis was analyzed by using SPSS. PLS-SEM was used to examine the relationships between each construct. The survey results of 200 participants were analyzed using SmartPLS. Data from online forms that participants filled out more than once have been deleted to avoid data duplication. The categorization of participants consists of age, experience, gender, and profession.

Result and Discussion

A pilot study has been conducted with 30 healthcare workers. In this study, all loading factors' values are above 0.6, which met the recommendation value (Hair *et al.*, 2017), except for TA1 items. In the construct reliability indicated by the Cronbach's Alpha of each construct, only technology anxiety values <0.7. However, the TA1 item was not deleted in the following survey since the result met the recommendation value with more respondents.

Table 1. Sample characteristics

Characteristics	n	%
Gender		
Male	64	32
Female	136	68
Age		
21-30	66	33
31-40	47	23.5
41-50	61	30.5
>50	26	13
Profession		
Doctor	90	45
Nurse	110	55
Experiences		
1-5 year	52	26
6-11 year	46	23
12-20 year	45	22.5
>20 year	57	28.4

Table 1 shows the sample characteristics data of this study. Of the 200 participants in this study, 68% are female, and 32% are male. Four age categories were made, consisting of 21-30, 31-40, 41-50, and >50 years old, with the highest

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.165-176

number of respondents in the 21-30 age group. The categorization of professions was divided into two groups, doctors (90 respondents) and nurses (110 respondents). The working experience is separated into four groups, with the majority of this survey having over 20 years of working experience. The Cronbach's alpha and composite reliability in the survey with 200 participants met the recommendation value (>0.7), ranged from 0.814 to 0.952, and composite reliability ranged from 0.875 to 0.969 (Hair *et al.*, 2017). The item validity was tested using discriminant and convergent validity tests. In the convergent validity test, all loading factors were >0.6.

Table 2. Measurement model assessment

Constructs	Indicators	Loadings	CR	AVE	Cronbach's Alpha
Performance expectancy (PE)	PE1	0.887	0.904	0.703	0.859
	PE2	0.836			
	PE3	0.854			
	PE4	0.772			
Effort expectancy (EE)	EE1	0.878	0.954	0.838	0.935
	EE2	0.943			
	EE3	0.916			
	EE4	0.923			
Social Influence (SI)	SI1	0.967	0.969	0.913	0.952
	SI2	0.951			
	SI3	0.948			
Facilitating Condition (FC)	FC1	0.698	0.875	0.638	0.814
	FC2	0.867			
	FC3	0.792			
	FC4	0.828			
Perceived Security & Data (PS)	PS1	0.935	0.961	0.893	0.940
	PS2	0.955			
	PS3	0.944			
Self-efficacy (SE)	SE1	0.860	0.917	0.735	0.878
	SE2	0.909			
	SE3	0.877			
	SE4	0.777			
Technology Anxiety (TA)	TA1	0.689	0.875	0.641	0.866
	TA2	0.922			
	TA3	0.695			
	TA4	0.870			
Intention to use telehealth (IU)	IU1	0.934	0.952	0.868	0.923
	IU2	0.904			
	IU3	0.955			

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(Jurnal Administrasi Kesehatan Indonesia)
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Since all loading factors were above the threshold, the reliability of each indicator is fulfilled. The average variance extracted from all variables was above the threshold (>0.5). In this research, cross-loading and the Fornell-larcker criterion were used to determine the construct's validity (Fornell and Larcker, 1981). The cross-loading results found that all loading item values have a higher value towards its indicator than the cross-loading value to another construct with a value >0.6. In the discriminant validity test, the square root AVE of each construct is greater for the construct itself than for other constructs (Fornell and Larcker, 1981; Binyamin, 2020). Thus, the construct reliability and validity fulfilled the recommendation. Table 2 presents the results of the measurement model assessment.

In the model fit test, the results of the estimated model show the standardized root mean square residual (SRMR) in this model is 0.075. This value meets the recommended value (<0.08), indicating the model is a good fit. The use of the SRMR is to prevent model specification errors. In addition, the normal fit index (NFI) value ranges from 0 to 1, with a value closer to 1 indicating the better the fit. The NFI value obtained from the estimated model in this research is 0.767. Unfortunately, this value cannot be categorized as a good fit criterion since this value is <0.9 (Henseler, Hubona and Ray, 2016).

The relationship between constructs was examined using path coefficients, *t*-values, and *p*-values. The results of a one-sided significance test with a significant level of 0.025 showed some hypotheses were supported (*p*-value < 0.05, *t*-values >1.96) (Hair *et al.*, 2010). This result indicates that EE, SI, FC, SE, and TA positively and significantly impact IU. The R^2 obtained is 0.756 for IU, 0.476 for EE, and 0.529 for PE, which means exogenous variables in this study explain 75% of the variance in the endogenous variable. The hypothesis testing result can be seen in Table 3, and the illustration is shown in Figure 1.

Table 3. Hypothesis testing

Hypothesis	β	*p*-Value	Result
PE-IU	0.101	0.083	Not Supported
EE-IU	0.347	0.000	Supported
EE-PE	0.727	0.000	Supported
SI-IU	0.126	0.012	Supported
FC-IU	0.186	0.003	Supported
PS-IU	-0.039	0.274	Not Supported
SE-IU	0.243	0.000	Supported
SE-EE	0.642	0.000	Supported
SE-EE-IU	0.270	0.000	Supported
TA-IU	0.103	0.003	Supported
TA-EE (-)	0.168	0.034	Supported

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.165-176

This study analyzed factors influencing healthcare workers' intentions in Indonesia towards telehealth using the modified unified theory of acceptance and use of technology (UTAUT) framework. Surprisingly, analysis results reveal that performance expectancy does not influence the intention to use telehealth. This finding contradicts previous studies (Hoque and Sorwar, 2017; Binyamin, 2020). Moreover, a similar result was found in a previous study in France examining IoT use in e-health, in which PE has no impact on the intention to use (Arfi *et al.*, 2021). As the system has not yet been established, users could be unaware of its benefits (Dhiman and Dogra, 2019). Several factors can affect contrast results, such as the sample composition, item, and other influences. The finding indicates that the benefits of telehealth, which can improve the performance and effectiveness of the study's healthcare workers, are not the primary reason for implementing the telehealth system.

The result shows that effort expectancy has the most influence on intention to use (β value = 0.347, *p*-value = 0.000). It also found that effort expectancy positively impacts performance expectancy. This finding is in line with previous research (Van Houwelingen *et al.*, 2018). Healthcare institutions should build an easy-to-use system to motivate the adoption of telehealth by healthcare workers. The social influence factor also affects healthcare workers' intentions, which agrees with previous studies (Cajita *et al.*, 2017; Binyamin, 2020). Therefore, to increase healthcare workers' intention, healthcare institutions can implement telehealth by prioritizing top-level healthcare workers in their institution so other healthcare workers will tend to follow. Pressure or encouragement from people around them, especially those who directly influence their work activities, can affect users' decision to adopt new technology (Binyamin, 2020).

In line with previous studies, facilitating conditions have a significant impact on healthcare workers' intentions (Khatun, Palas and Ray, 2017; Binyamin, 2020; Arfi *et al.*, 2021). Training for healthcare workers is required to implement new technology to make learning the new system or technology easier. They want to implement telehealth if

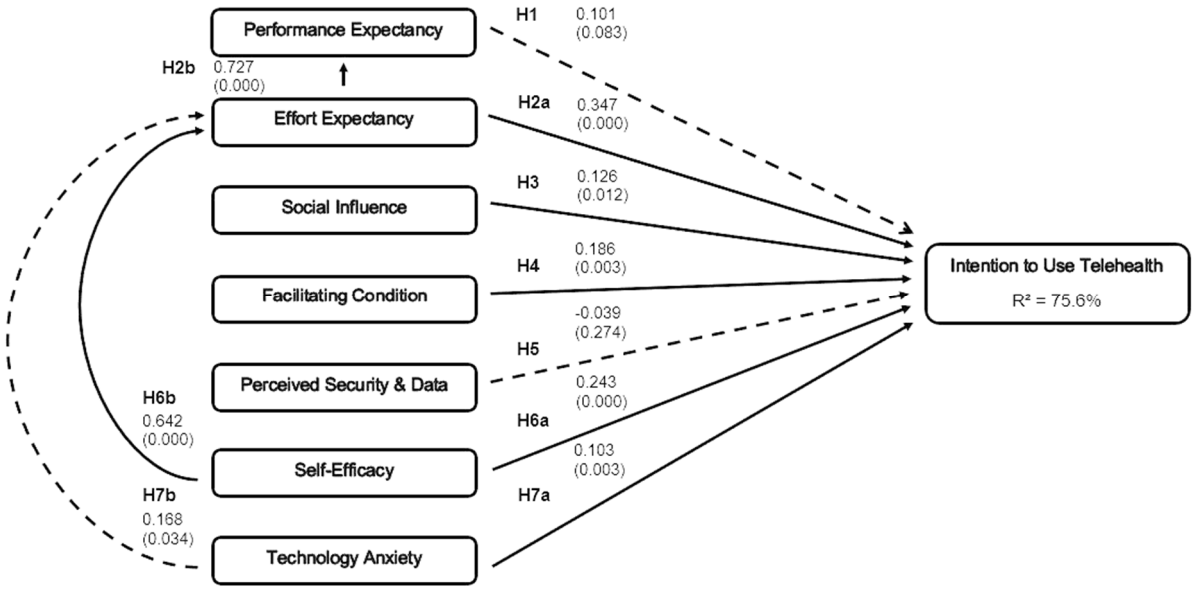

Figure 1. Hypothesis testing results illustration

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.165-176

their institution has sufficient resources. Moreover, the confidence and trust of healthcare workers toward telehealth will improve as human resources in their institutions are adequate. The regulation of the system must also be clear, so it can be used optimally while following established laws and regulations.

However, it shows that perceived security and data do not affect the intention. A previous study supported this result (Zhou *et al.*, 2019). This result could be interpreted in two possibilities; healthcare workers believe their security and data system in their institution is adequate, or there is still a lack of awareness regarding data security. Previous studies show that there is still a lack of security awareness in Indonesia (Kusyanti, 2017). On the other hand, self-efficacy has an influence on motivating healthcare workers' intention (β value = 0.243, *p*-value = 0.000), supported by the previous study (Van Houwelingen *et al.*, 2018). It shows that healthcare workers believe they can successfully adjust to implement telehealth in the future. Therefore, implementing telehealth does not seem to be a significant obstacle to providing better services.

Self-efficacy is an important determinant in system users' performance and has been proven to have a behavioral and psychological impact in various research fields (Van Houwelingen *et al.*, 2018). In this research, self-efficacy also indirectly affects intention through effort expectancy. Thus, users' effort expectancy will automatically increase if their self-efficacy increases (Van Houwelingen *et al.*, 2018). Similar to self-efficacy, technology anxiety significantly affects healthcare workers' intentions. Healthcare workers feel the implementation of telehealth makes them a little uncomfortable, and they doubt the system's reliability. In addition, they worried since it could directly change their interaction with patients. This result agrees with previous studies (Tsai *et al.*, 2019). Subsequently, the result shows no relationship between technology anxiety to effort expectancy, consistent with the previous research (Tsai *et al.*, 2019).

Conclusion

The finding of this study indicates that five exogenous variables, which are effort expectancy, social influence, facilitating condition, self-efficacy, and technology anxiety, significantly influence the intention toward telehealth. The proposed framework proposed in this study is appropriate to identify the factors influencing the intention with the R^2 value and the standardized root mean square residual (SRMR) obtained in the model fit test. The study's results prove that effort expectancy has the greatest influence on intention, effort expectancy has a significant effect on performance expectancy, and self-efficacy influences effort expectancy. It is in line with Van Houwelingen et al.'s finding that users are very concerned about the convenience of the new technology (Van Houwelingen *et al.*, 2018). Furthermore, this research discovered the indirect effect of self-efficacy on intention to use telehealth through effort expectancy, which has not been mentioned in previous studies.

On the other hand, performance expectancy and perceived security and data were found to have no significant effect on the intention of healthcare workers to use telehealth. Healthcare institutions that intend to adopt telehealth should consider these issues. Although perceived security and data do not affect the intention to adopt telehealth from healthcare workers' perspective in this study, healthcare institutions should be concerned about it, especially if telehealth is developed in partnership with non-

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.165-176

institutional stakeholders. In implementing telehealth in the future as an alternative during the pandemic as well as endemic, healthcare institutions should maximize factors influencing healthcare workers' intentions to accelerate adoption and benefit all parties, including healthcare institutions, stakeholders, and patients.

This research fills the gap in healthcare research as studies discussing this sector in Indonesia and developing countries are limited. Adding additional variables was proven to influence the intention except for perceived security and data. Although this study enriches previous research, it has some limitations. First, in this study, the factors of PE and PS showed no influence on the intention. Insignificant results can occur due to the items used, the number of respondents, etc. The number of respondents in this study is limited due to the pandemic leading to only a few institutions willing to participate. Therefore, further research needs to analyze with more participants. Second, this finding cannot represent healthcare workers' intention toward telehealth across Indonesia since it was only conducted in two cities on a small scale. Further research needs to cover a larger area.

Third, this study found the indirect effect of self-efficacy. However, several factors influencing intentions in previous studies are not included since this study only focused on healthcare workers' perspectives. Further research needs to analyze the possible indirect effect of other factors and use more items, with more categorization of respondents. In addition, qualitative research is required to find undiscovered factors from previous studies. Finally, future research needs to determine which factors influence the intention from the patient's perspective.

Abbreviations

Covid-19: Coronavirus Disease of 2019; UTAUT: Unified Theory of Acceptance and Use of Technology; PLS-SEM: Partial Least Square-Structural Equation Modeling; SRMR: Standardized Root Mean Square Residual.

Declarations

Ethics Approval and Consent Participant

This research has obtained institution permits from Surakarta Public Health Office (Dinas Kesehatan Kota Surakarta) as well as Permits from several private hospitals in Bandung to conduct the survey. Participants were given all information about the purpose of this study. All participants' data were protected and only used for this study.

Conflict of Interest

The authors declare that there is no significant competing financial, professional, or personal interests that might have affected the study.

Availability of Data and Materials

Data and materials in this study can be provided by request from the journal.

Authors' Contribution

MRF conceptualized the study, created the methodology, analyzed the data, and edited the manuscript; MHB and PFB reviewed and analyzed the study results.

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Indonesian Journal of Health Administration
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Original Research

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UNMET NEED FOR HEALTHCARE AMONG PEOPLE WITH HYPERTENSION IN INDONESIA

Unmet Need *Pelayanan Kesehatan pada Penderita Hipertensi di Indonesia*

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Abstract

Background: Hypertension is a worldwide public health problem, mainly due to its high frequency and risks leading to cardiovascular diseases. The prevalence of hypertension in the Indonesian population aged > 18 years in 2018 was 34.11%. The unmet need for healthcare has generally been explored in most empirical studies concerning people with hypertension.
Aims: This study investigated the determinants of unmet needs for healthcare among people with hypertension.
Methods: The design of this study was cross-sectional on data from the Indonesian Family Life Survey wave 5 (IFLS-5). The survey sample was 6,302 adults aged > 40 years stratified by rural/urban residence status. A three-level multilevel analysis was performed to estimate the individual, household, and community-level determinants of unmet needs for hypertension care.
Results: As many as 78.4% of the respondents with hypertension reported unmet needs for healthcare. Age, female, single, income, having insurance, urban residence, and the number of health-integrated posts for the elderly (*Posyandu Lansia*) were significantly associated with umeet needs for healthcare utilization among people with hypertension, while education and employment status showed no association with these variables.
Conclusion: Improvement in access to healthcare and reduction in health inequality is required to address this problem.

Keywords: healthcare, hypertension, IFLS, unmet need

Abstrak

Latar Belakang: *Hipertensi merupakan masalah kesehatan masyarakat di seluruh dunia, terutama karena frekuensi dan risikonya yang tinggi terhadap penyakit kardiovaskular. Prevalensi hipertensi pada penduduk Indonesia usia > 18 tahun pada tahun 2018 sebesar 34,11%. Angka unmet need layanan kesehatan umumnya telah banyak dieksplorasi, tetapi studi empiris mengenai unmet need pelayanan kesehatan pada penderita hipertensi masih terbatas*
Tujuan: *Penelitian ini bertujuan untuk mengetahui determinan unmet need pelayanan kesehatan pada penderita hipertensi.*
Metode: *Desain penelitian ini adalah cross-sectional, menggunakan data dari Indonesian Family Life Survey gelombang 5 (IFLS-5). Sampel penelitian adalah 6.302 orang dewasa usia> 40 tahun, yang distratifikasi berdasarkan pedesaan/perkotaan. Analisis multilevel dilakukan untuk mengestimasi tingkat individu, tingkat rumah tangga, dan tingkat komunitas terhadap angka unmet need layanan kesehatan hipertensi*
Hasil: *Data menunjukkan bahwa 78,4% responden dengan hipertensi melaporkan unmet need pelayanan kesehatan. Umur, perempuan, belum menikah, pendapatan, memiliki asuransi, tinggal di perkotaan, dan jumlah Pos Kesehatan Lansia (Posyandu Lansia) secara signifikan berhubungan dengan pemenuhan kebutuhan akan pemanfaatan pelayanan kesehatan pada penderita hipertensi, sedangkan status pendidikan dan pekerjaan tidak menunjukkan keterkaitan.*
Kesimpulan: *Peningkatan akses ke pelayanan kesehatan dan pengurangan ketimpangan kesehatan diperlukan untuk mengatasi masalah ini.*

Kata kunci: *hipertensi,* IFLS*, layanan kesehatan, unmet need*

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Introduction

Hypertension is regarded as a global public health problem in both developed and developing countries because of its high prevalence and risks leading to cardiovascular disease (Shah, Shah and Shah, 2018). It is also a major factor for noncommunicable diseases (NCDs) that continue to increase. NCDs in Indonesia was estimated to account for 73% of all deaths in 2016, and blood pressure was one of the hypertension factors in adults aged 18 years and above (22%) (World Health Organization, 2018). According to Indonesian Basic Health Research (*Riskesdas*) in 2018, the prevalence of hypertension in the Indonesian population aged 18 years and above was estimated at 34.11 (National Institute of Health Research and Development Republic of Indonesia, 2018).

The prevalence of hypertension significantly causes worldwide mortality and morbidity (Ezzati *et al.*, 2002; Yano *et al.*, 2018). It gradually damages the heart, blood vessels, and other organs without apparent symptoms, and thus, it is recognized as a silent killer (Yano *et al.*, 2018). People with resistant hypertension are more likely to be older, overweight, diabetic, and have uncontrolled blood pressure (Williams, 2009).

Therefore, prevention and control of NCDs have become one of the national priority programs in the health sector in Indonesia. In 2016, the Indonesian Ministry of Health issued a national program called Healthy Indonesia with a Family Approach (*PIS-PK*) (Department of Health Republic of Indonesia, 2009). The success of this program is measured by the Healthy Family Index (*IKS*) formulated from four national health priorities, which are reducing maternal mortality, reducing infant mortality and stunting prevalence, controlling communicable diseases (HIV/AIDS, tuberculosis, and malaria), and controlling NCDs (hypertension, diabetes mellitus, cancer, obesity, and mental disorders) (Ministry of Health Republic of Indonesia, 2016)

The unmet need for healthcare is an undesirable feature of modern healthcare (Krůtilová, 2016). Unmet need for healthcare is the proportion of people who suffer from illness but have not received health services. A recent study regarding hypertension among Indonesian adults aged 40-65 years using IFLS-4 from 2007 datasets described a low prevalence of antihypertensive medication. The research stated that 37% of people with hypertension were diagnosed or aware, and only 25% were treated with prescribed antihypertensive medication (Hussain *et al.*, 2016).

Other studies have discussed difficult access to health services influenced by various factors, such as reduction in consumer trust in hospital in-patient services, lack of continuity in the health system, culture and resources, inconvenient timing of appointments, and the long-term implications of accessing healthcare (Awofeso, Rammohan and Asmaripa, 2012; Adedini *et al.*, 2014; Turner, Szaboova and Williams, 2018; Meiqari *et al.*, 2019). Moreover, personal choice, waiting time, and cost become other contributing factors to unmet needs for healthcare (Sanmartin *et al.*, 2002; Shi and Stevens, 2005; Allin, Grignon and Le Grand, 2010; Connolly and Wren, 2017). Generally, unmet need for healthcare depends on the aspects of the healthcare system (timing of appointments, waiting time prior to treatment, and others) and, in certain situations on individual factors (personal choice, trust, cost, and others).

However, previous studies barely explored unmet need for health care among people with hypertension. Therefore, this current study investigated

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.177-187

the determinants of the unmet need for healthcare among people with hypertension.

Method

In this study, a cross-sectional design was adopted to collect data from the Indonesian Family Life Survey wave 5 (IFLS-5) database in the periods of 2014-2015. IFLS-5 contains detailed information collected at the individual and household levels, including multiple indicators of socioeconomics and health. It is the only large-scale longitudinal survey available for Indonesia; it was conducted through a multistage random sampling method across 13 provinces representing 83% of the population in Indonesia (Strauss, Witoelar and Sikoki, 2016).

The respondents were aged 40 years and older and had hypertension categorized by measurement systolic of > 140 mmhg or diastolic of > 90 mmhg. The blood measurement was taken three times. A sample of 6,302 people fulfilled the criteria. The dependent variable in this study was the unmet need for health services. If the respondents had hypertension but did not access health services either in primary healthcare centers, clinics, and hospitals in the last four weeks, they were considered to have unmet needs for healthcare.

Covariates

Some variables to investigate the unmet need for healthcare were based on socio-economic and demographic statuses at the individual level. Economic status was measured from variable log household expenditure and the number of health integrated posts for the elderly (*Posyandu Lansia)* at the community level. The health integrated posts are community-based health promotion centers at the village level supervised by staff from the nearest primary healthcare center. Since the mid-1980s, the Indonesian Ministry of Health has launched services to older people through that program. To deal with the increasing prevalence of hypertension and other chronic conditions, several preventive and health promotion measures have been reinforced in local communities through that program (Madyaningrum, Chuang and Chuang, 2018). Older people frequently obtained anti-hypertensive medications (26%) through primary healthcare centers performed by staff members (midwives or nurses) (College and Deer, 2017). Other covariates at the individual level were age, sex (female and male as a reference), educational attainment (primary school or lower as a reference, secondary class, and college or higher), marital status (married as a reference, single, divorced, and widowed), employment status (casual workers as reference, government workers, private workers, self-employed, and unemployed), and health insurance ownership. This study also had descriptive statistics of ages in eight groups (40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, and +75).

Statistical analysis

Data analysis was carried out in two steps: bivariate analysis and multivariate analysis. The bivariate analysis assessed a relationship between two variables: 1) residence and 2) each of its determinants (separately). The Kruskal-Wallis one-way analysis of variance was used for numerical variables and ordinal chi-square tests for categorical variables. The multivariate analysis identified an association between the healthcare utilization and all risk factors using tree-level hierarchical logistic regression models accounting for the information on household and community levels available from the IFLS. The first level comprised individual characteristics; the second level was household

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.177-187

characteristics, and the third was community characteristics.

The multivariate analysis used two models. The first model included only the individual-level variables, including socio-demographic variables of age, gender, marital status, education, employment status, and health insurance ownership. Household expenditure was added to the household level determinant; rural/urban category and the number of *Posyandu Lansia* as the community level determinants were in the second model. The hierarchical logit regression using xtmelogitcommands was performed in STATA 14.0 software (Wolfe, 2006).

Result and Discussion

A total of 6,302 respondents aged 40 years and over were included in the analysis. About 78.4% of the respondents with hypertension did not receive healthcare services (see Table 1). The average respondent's age was 57 years old. Meanwhile, 16.80% of the respondents were 50-54 years old. More than half of the respondents (56.50%) were female. Most of the respondents had low education attainment (63.4%); most were married (74.3%), and most were unemployed (90.7%); thus, nearly half had no health insurance (54.24%). The average household expenditure was Rp953,005.12, with a standard deviation of Rp606,991.47. The average household expenditure for urban areas was Rp968,233.01 with a standard deviation of Rp779,509.13 and for rural areas was Rp932,716.29 with a standard deviation of Rp221,659.79. The standard deviation value illustrated the variation in household expenditure in urban areas was higher than in rural areas. The average number of *Posyandu Lansia* per village was two (Table 1).

The bivariate logistic regression model in Table 1 shows that four predictions are statistically significant with unmet needs at a 1% level. The proportion of respondents with unmet needs in urban was higher than in rural. At the individual level, age, educational level, employment status, and insurance ownership were all correlated positively with unmet needs. Household expenditure was statistically significant correlated with the unmet need for healthcare among people with hypertension at 5 % level. Sex and marital status failed to achieve the statistical significance with the unmet need for healthcare.

Factors associated with unmet need for healthcare among people with hypertension, as revealed by the multivariate analysis, are presented in Table 2. Older age was associated with lower odds of having unmet need for healthcare services (OR = 0.987; $p < 0.001$) in the first model, but this association diminished after household and community level variable were included in the second model (OR = 0.989; $p < 0.05$). Being female and having health insurance had significant and negative significant associations with unmet need for healthcare services. Unmarried respondents had higher odds of having unmet need for healthcare services than married ones. The respondents living in urban areas had lower odds of having unmet need for healthcare services than those in urban areas (OR = 0.774; $p<0.001$). The number of the integrated-health posts for the elderly in the community had a negative and significant association with unmet need for healthcare services (OR = 0.72; $p<0.001$) (Table 2).

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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Table 1. Characteristics of the participants

	Total n=6,302	Urban n=3,600	Rural n=2,702	P-value
Individual-level				
Healthcare utilization				<0.001
No	4,940 (78.40)	2,757	2,183	
Yes	1362 (21.60)	843	519	
Age (years)	57.17 (16.62)	56.53(19.31)	58.02 (12.10)	<0.001
Age group				<0.001
40-44	929 (14.70)	565	364	
45-49	1038 (16.50)	621	417	
50-54	1,056 (16.80)	602	454	
55-59	896 (14.20)	537	359	
60-64	823 (13.10)	476	347	
65-69	504 (8.00)	284	220	
70-74	498 (7.90)	251	247	
75+	558 (8.90)	264	294	
Sex				0.730
Male	2,741 (43.50)	1,573	1,168	
Female	3,561 (56.50)	2,027	1,534	
Educational level				<0.001
Primary school or less	3998 (63.4)	1901	2097	
Secondary school	1807 (28.7)	1330	477	
College or higher	497 (7.9)	369	128	
Marital status				0.068
Single	118 (1.9)	80	38	
Married	4682 (74.3)	2687	2004	
Divorced	1471 (23.3)	822	649	
Widower	31 (0.5)	20	11	
Employment status				<0.001
Casual workers	53 (0.8)	25	28	
Government workers	81 (1.3)	69	12	
Private workers	209 (3.3)	177	32	
Self-employed	241 (3.8)	124	117	
Not working	5718 (90.7)	3205	2513	
Health insurance ownership				<0.001
No	3,226 (54.24)	1,563	1,663	
Yes	3,076(45.76)	2,037	1,039	
Mean systolic BP (mmHg)	161.23 (21.26)	160.68 (21.18)	162.00 (21.35)	0.015
Mean diastolic BP (mmHg)	92.41 (12.62)	92.94 (12.19)	91.71 (13.13)	<0.001
Household-level				
Household expenditure	953,005.12 (606,991.47)	968,233.01 (779,509.13)	932,716.29 (221,659.79)	0.009
Community-level				-
Number of integrated health posts for elderly	2 (0.00)	2 (0.00)	2 (0.00)	

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.177-187

Table 2. Determinants of the unmet need of healthcare services among sample with hypertension

	Model 1	Model 2
Individual-level		
Age	0.987 (0.003)‡	0.989 (0.004)†
Female	0.600 (0.046)‡	0.638 (0.059)‡
Marital status, reference: Married		
Single	5.201 (2.305)‡	6.941 (3.802)‡
Divorced	1.150 (0.108)	1.192 (0.132)
Widower	2.086 (1.223)	3.502 (2.855)
Education, reference: Primary		
Secondary	0.930 (0.079)	1.004 (0.109)
College and higher	1.024 (0.144)	1.298 (0.265)
Employment status, reference: Casual workers		
Government workers	1.136 (0.520)	1.428 (0.779)
Private workers	1.118 (0.445)	1.352 (0.600)
Self-employed	0.950 (0.368)	1.205 (0.501)
Not working	1.297 (0.463)	1.950 (0.744)*
Having insurance	0.693 (0.051)‡	0.721 (0.065)‡
Household-level		
Log household expenditure		0.610 (0.044)‡
Community-level		
Living in an urban area		0.774 (0.084)†
Number of integrated health posts for elderly		0.864 (0.048)‡
Constant	11.290 (5.055)‡	8116.32 (9112.02)‡
Variance between households	0.18	0.17
Variance between communities	0.57	0.72
Log-likelihood	35.63	27.85

Note: Reported are odds ratios (standard errors). Sig.: *significant at 10% or less; †significant at 5% or less; ‡significant at 1% or less.

Hypertension is one of the NCDs that is commonly found in developing countries, including Indonesia. Therefore, the Indonesian Ministry of Health launched a programme concerning the implementation of *PIS-PK* in 2016 as hypertension care could be an indicator of healthy family. Various studies have reported the risk factors of hypertension. Previous research demonstrated that in university students in Thailand, older age, obesity and underlying morbidity due to diabetes, high blood lipids and kidney disease were strongly associated with increased risk of hypertension (Thawornchaisit *et al.*, 2013). Other similar research revealed that hypertension in the urban slum Nairobi, Kenya was a public health problem affecting at least one in three adults aged 35–64 years; this study found several variables, such as age, marital status, wealth index, physical inactivity, and body mass index were important risk factors associated with hypertension (Olack *et al.*, 2015). An analysis of the SAGE dataset from households in China, Ghana, India, Mexico, Russia, and South Africa illustrated that obesity was noticeably correlated to hypertension, along with aging (Basu and Millett, 2013). In Varanasi, India, aging, and sex (specifically men) were likely independent risk factors for hypertension (Singh, Shankar and Singh, 2017). Other protective risk factors of hypertension in urban population were unemployment,

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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retirement, and student status (Wang *et al.*, 2018).

Several national studies investigated the determinants of unmet need for healthcare among people with hypertension in Indonesia. Identified from a recent national survey, poor access to healthcare facilities became one of the determinant factors of hypertension (Ibrahim and Damasceno, 2012). This study showed that unmet healthcare was found in more than three-quarter of people with hypertension in Indonesia. At the individual level, age, female sex, and health insurance ownership were important determinants of unmet need for healthcare among people with hypertension. The increasing number of health problems along with age will increase the probability of unmet need for healthcare (Herr *et al.*, 2013).

In regard to sex, females have a higher likelihood of healthcare than males. Previous research described a higher number of unmet healthcare needs among females (Nelson and Park, 2006; Pappa *et al.*, 2013). Health insurance ownership had a positive correlation with unmet need for healthcare. The study presented that respondents who owned health insurance were more likely to receive healthcare. According to a previous similar study, adults with long-term uninsured were significantly more likely to have unmet needs for preventive service than those with health insurance (Ayanian *et al.*, 2000).

This current study initiated an investigation on factors associated with unmet need for healthcare in people with hypertension in Indonesia from the national survey datasets. Focusing on household determinants, household expenditure was an important determinant of unmet need for healthcare among people with hypertension. It supports prior findings that the poor individual increases the risk of unmet need for healthcare (Heo *et al.*, 2012).

Turning to community-level determinants, urban residence, and the number of the integrated-health posts for the elderly were important determinants of unmet need for healthcare among people with hypertension. Urban residence was correlated with a lower probability of unmet need for healthcare. Furthermore, the respondents in urban were more likely to receive healthcare services. The findings are consistent with the previous research in which residence was significantly associated with unmet need for cardiovascular treatment (Heo et al. 2012; Maharani and Tampubolon, 2014). The availability of healthcare facilities contributed to unmet healthcare (Diwan and Moriarty, 1995). Even the individual perception of healthcare availability could result in unmet needs for healthcare (Hwang *et al.*, 2017).

Above all, this study has some limitations. Firstly, it used a cross-sectional design which collected casual observation results. Secondly, some variables affecting unmet need for healthcare were not explored due to the unavailability of data on the quality of healthcare, while this factor could be associated with demand for that variable (Pappa *et al.*, 2013; Liu *et al.*, 2018; Wellay *et al.*, 2018).

Despite its limitations, this study has several strengths. Firstly, nationally representative samples derived a high response rate using a standardized methodology. Secondly, this study thoroughly observed determinants at all levels. Therefore, it could capture real conditions of the population using the multilevel modelling analysis to examine the clustering effect of the outcome variables.

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Conclusion

Determinants of unmet need for healthcare among people with hypertension at the individual, household and community levels in Indonesia were age, female, single, income, having insurance, urban residence, and the number of health integrated posts for the elderly. With a multilevel regression analysis, this study clearly depicts the high prevalence of unmet need for healthcare in Indonesia. Therefore, the Indonesian government should improve equity in healthcare by expanding health insurance and providing more health posts for elderly that can be accessed in both rural and urban. Future studies are required to identify other factors associated with healthcare utilization among people with hypertension. Particularly, they can address the role of cadre, family, and health worker for the provision of healthcare.

Abbreviations

HIV/AIDS: Human immunodeficiency virus/ Acquired Immune Deficiency Syndrome; IFLS-5: Indonesian Family Life Survey Wave 5; *IKS: Indeks Keluarga Sehat* NCDs: Noncommunicable Diseases; *PIS-PK: Program Indonesia Sehat dengan Pendekatan Keluarga; Posyandu Lansia: Pos Pelayanan Terpadu bagi Lanjut Usia*; *Riskesdas: Riset Kesehatan Dasar*; WHO: World Health Organization;

Declarations

Ethical Approval and Consent Participant

This study has passed the ethics review from the Ethics Review Center of the Faculty of Public Health, Sriwijaya University with a letter of ethical qualification No. 176/UN9.1.10/KKE/2020.

Conflict of Interest

The authors declare that they have no competing interests.

Availability of Data and Materials

Data and material research can be provided upon request.

Authors' Contribution

AA conceptualized the study design and contributed to review and edit the manuscript. AM and AR collected the raw data for analysis and performed data interpretation. HI conceptualized the original draft of the manuscript. All authors read and approved the final manuscript.

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Original Research

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THE INFLUENCE OF TEAM COHESION AND TRUST ON TEAM EFFECTIVENESS IN PREVENTING TUBERCULOSIS

Pengaruh Kohesi dan Kepercayaan Tim terhadap Efektifitas Tim dalam Penanggulangan Tuberculosis

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Abstract

Background: The transmission of tuberculosis (TB) is hard to stop. Surabaya city has the highest TB cases in East Java and only achieved <90% of the target in 2017-2018. The formation of preventing TB team in every primary health care (PHC) is expected to work effectively in preventing TB cases in society.
Aims: This study aimed to analyze the impact of cohesion and trust within a team on team effectiveness in preventing TB cases in Surabaya.
Methods: This study was an observational study with a cross-sectional design conducted in 43 primary healthcare centers (PHC), and it involved 319 respondents selected by proportional stratified random sampling. The data were collected through questionnaires and tested descriptively and through multivariable linear regression to confirm the most significant models of independent variables and dependent variables.
Results: The result showed that task cohesion of the cohesion variable (RR= 0.374; p= 0.014) and cooperative behaviors of the trust variable (RR= 0.558; p= 0.000) had a significant influence on team effectiveness. The others dimension of team cohesion and trust had no significant impact on team effectiveness.
Conclusion: Team effectiveness is dependent on team cohesion and trust that the teamwork process component. The Surabaya City Health Office needs to collaborate with the PHC management to evaluate the teamwork of the preventing TB team through in-depth interviews or other methods to get the problem in the team.

Keywords: healthcare, system organization, team cohesion, team trust, tuberculosis.

Abstrak

Latar Belakang: *Penularan tuberculosis (TB) merupakan penyakit yang sulit untuk dihentikan. Kota Surabaya adalah kota dengan pertambahan kasus TB tertinggi di Jawa Timur dan masih mencapai target <90% selama periode 2017-2018. Pembentukan tim penanggulangan TB di setiap Puskesmas diharapkan dapat bekerja secara efektif dalam menanggulangi kasus TB pada masyarakat.*
Tujuan: *Penelitian ini bertujuan untuk menganalisis pengaruh kohesi tugas dan kepercayaan terhadap efektifitas kerja tim dalam penanggulangan TB di Kota Surabaya.*
Metode: *Penelitian ini merupakan penelitian observasional dengan desain potong lintang yang dilaksanakan pada 43 Puskesmas dan melibatkan 319 responden yang terpilih dengan sampling terstratifikasi proporsional. Data diperoleh dengan menyebarkan kuisioner dan kemudian diuji secara deskriptif dan uji multivariable regresi linier untuk mengkonfirmasi model paling signifikan terhadap variabel bebas dan terikat.*
Hasil: *Hasil penelitian menunjukkan bahwa dimensi kohesi tugas pada variable kohesi tim (RR=0.374; p= 0.014) dan perilaku kooperatif pada variabel rasa percaya tim (RR= 0.558, p= 0.000) memiliki pengaruh yang signifikan terhadap efektifitas tim. Sedangkan dimensi lain di dalam variabel kohesi dan kepercayaan tim tidak memiliki pengaruh yang signifikan terhadap efektifitas tim.*
Kesimpulan: *Disimpulkan bahwa kohesi dan kepercayaan tim sebagai proses tim memiliki pengaruh yang signifikan terhadap efektifitas tim. Disarankan kepada Dinas Kesehatan Kota Surabaya berkolaborasi dengan manajemen Puskesmas, untuk melakukan evaluasi terhadap proses tim dengan melakukan indepth interview atau metode lain untuk mendapatkan persoalan tim penanggulangan TB dalam melaksanakan program.*

Kata kunci*: kohesi tim, kepercayaan tim, layanan kesehatan, sistem organisasi, tuberculosis.*

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Introduction

Tuberculosis (TB), one of the communicable diseases caused by *Mycobacterium Tuberculosis,* still becomes a challenging health issue in Indonesia. The government has tried to stop TB transmission by 2030. The Regulation of the Indonesian Ministry of Health No. 67/2016 describes preventive efforts to overcome TB cases, one of which is to form a team at the sub-district level under primary healthcare centers. According to Burn (2004), a team is a working group consisting of more than two people who have equal competence and are independent in their work. It is also defined as a group of two or more people interacting with each other, being part of an organization, and having the organization's goals (McShane and Von Glinow, 2018).

The team, which consists of doctors, nurses, and laboratory analysts, is responsible for carrying out TB prevention, and control programs success is measured by case detection rate, case notification rate, and success rate. The success rate shows the number of TB patients who undergo the whole treatment. The preventing TB teams are in charge of promotive preventive, curative, and rehabilitative measures for TB cases mini, based on Indonesian Ministry of Health Regulation No.67/2016 about TB Control.

On the other hand, the number of TB cases in Indonesia increases every year. In East Java in 2019, 330,025 people were suspected of TB, thus stating East Java as one of the provinces with the highest suspected TB in Indonesia. The patients who received good TB services 96.5%. Moreover, Surabaya city, located in East Java Province, had the highest TB cases. The trend of positively confirmed TB cases in Surabaya increases every year. Its success rate from 2015 to 2018 was, on average 78.23% which did not reach the target (>90%) (Dinas Kesehatan Kota Surabaya, 2019). Treatment has a major role in breaking the chain of TB cases and reducing multidrug resistance. When the treatment failed, it increased the probability of multidrug-resistance cases.

Based on the Regulation of the Indonesian Ministry of Health No. 67 of 2016, the team is also responsible for TB treatment. There are a lot of problems during implementing the TB prevention program. The preliminary interview results showed team effectiveness seems to be affected by trust between team members and team cohesion. The preliminary interview was conducted with the preventing TB team's leader who is responsible for managing the teamwork. Furthermore, trust among team members affects project success, which also affects cohesion and knowledge sharing among members(Imam and Zaheer, 2021).

Ilgen (2006), in line with McShane and Von Glinov's theory (2018) mentions team effectiveness includes assessing team performance targets and meeting the needs of each team member. In this study, team effectiveness is considered the satisfaction and desire of team members to work in the same team. Changing team members will impact team effectiveness in the program implementation. Based on this background, this study further examined the influence of cohesion and trust on team effectiveness in preventing TB cases.

Our study hypnotized that team cohesion and team trust had a significant impact on team effectiveness. The data analyzed came from team members' questionnaire answers. The data were analyzed statistically to confirm our hypothesis; thus, the result was the baseline for discussion and recommendations to related parties.

Method

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An observational study was conducted using a cross-sectional design and a proportional stratified random sampling method to select the samples. The analysis unit in this study was primary health care in Surabaya city, with the population of this study was preventing TB teams in Surabaya City. It involved 43 primary healthcare centers consisting of 29 with a success rate of >90.01% and 14 with an unachieved success rate (<90.01%). A questionnaire was tested for validity and reliability using the Pearson test before data collection. It was distributed twice by the researchers and enumerators to doctors, nurses, and laboratory analysts who work closely with patients. Questionnaires about cohesion and trust were first disseminated than the team effectiveness questionnaire. Of 345 team members, only 318 answered correctly.

The questionnaire scales include strongly agree, agree, disagree, and strongly disagree. Individual and average scores of all members are considered (Ehrhardt *et al*., 2014). The linear multivariable regression test was applied to collect the average score of each team member based on the significant value through a backward model. The variable is deemed significant if a p-value is less than α (0.05). Before the multivariable regression test, linear regression assumption testing was carried out, namely the normality test, the non-multicollinearity test, and the non-heteroscedasticity test. The normality test in this study, using the P-Plot test with SPSS version 25 software, was declared normal if the data pattern was around the line. The next test is a multicollinearity test, looking at the tolerance value of >0.10 and the VIF value of <10. If the variable meets these values, then it is worth doing a regression test. The next test is the heteroscedasticity test by statistical means of a glejser test with a significance value between the residual >0.05 then there is no heteroskedasticity problem. Figure 1 illustrates how team effectiveness is affected by cohesion and trust within a team.

Team cohesion of this study defined the perception of the team preventing TB members related to their desire and motivation to become team members (McShane and Von Glinow, 2018). Team cohesion consists of three dimensions: task cohesion, social cohesion, and individual attraction to a group. Team trust in this study defined the perception of the team preventing TB members related to their positive expectations among the other team preventing TB members (McShane, and Von Glinow, 2018). Team trust consists of four dimensions: the propensity of trust, perceived trustworthiness, cooperative behaviors, and monitoring behaviors.

Cohesion, an independent variable assessed, includes three dimensions: task cohesion, social cohesion, and individual attraction to a group. The cohesion questionnaire is modified using the GEQ (Brawley, Carron, and Widmeyer, 1987). One of the questions listed for the task cohesion dimension was, "according to my opinion, all of the team members were united to reaching the target of preventing TB program". The social cohesion questionnaire list example was "according to my opinion, all of the team members were closed to each other". One individual attraction to the group dimension was "according to my opinion, each team member befriended each other."

Trust in a team is modified using a questionnaire by Costa and Anderson (2011). This variable consists of four dimensions: the propensity of trust, perceived trustworthiness, cooperative behaviors, and monitoring behaviors. Team effectiveness, a dependent variable, was measured from member satisfaction and survival according to the theory by McShane and Von Glinow (2018).

Indonesian Journal of Health Administration
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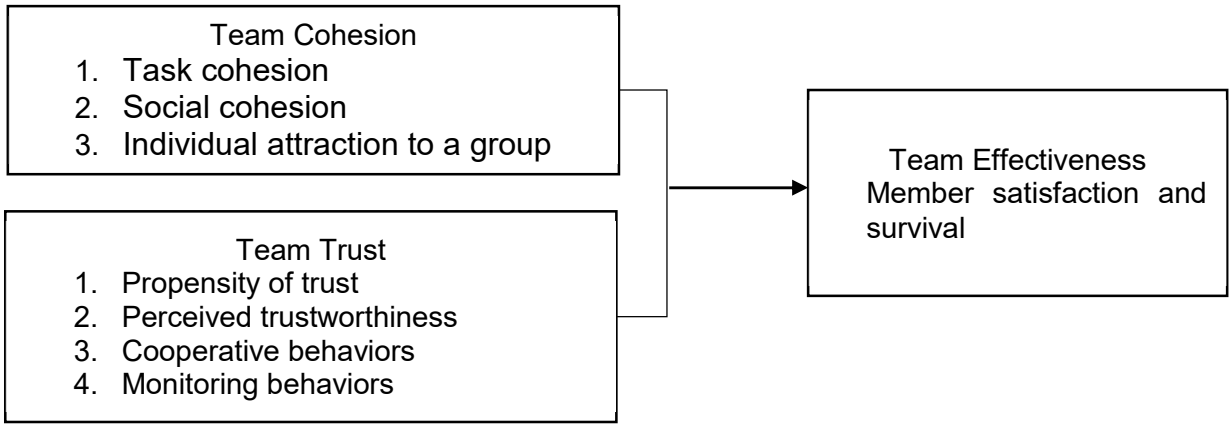

Figure 1. Research Framework

The question for the propensity of trust dimension, one of the list was “according to my opinion, each team members ask for assistance openly. The example for the perceived trustworthiness dimension question was “according in my opinion, each team member can rely on each other”. The cooperative behaviors dimension’s question was “according to my opinion, each team member always considering the member's opinion before deciding plan activities.” The question for monitoring behaviors dimension was, “according to my opinion, all of the team members slightly oversee the other member's activities".

The team effectiveness consists of two sub-variables. The first is to satisfy member needs, and the last is to maintain team survival. The questionnaire for this variable was constructed from 11 question list. The example for the questionnaire was “according to my opinion, the team’s conflict was resolved clearly.”

The average score of team members was analyzed descriptively and calculated statistically. According to the Pareto principle, 80% of consequences would occur because of 20% of causes. The cutting point of mean value less than 3.20 is captured from 80% of marks by a problem. Each answer is worth four points.

Results and Discussion

This study analyzed the influence of cohesion and trust within a team on work effectiveness in TB prevention. The influence of each dimension of the independent variables is described in Table 1.

Cohesion within the teams is mostly integrated (93%) with a mean value of less than 3.20, meaning that they faced problems. The effect of every dimension of cohesion on team effectiveness was still low. Task cohesion was considered weak. Social coherence is at a mean value of 2.98, indicating the teams had a poor coherent relationship. The individual attraction to a group has a mean value of 3.00, indicating a lack of cohesion (Lestyoningrum, 2020).

Cohesion is the process by which members share the same desire to work in the team (Grossman *et al*., 2015). A team must have an integrated coherence to support each other to achieve work targets and objectives. The low mean value of the social cohesion dimension is caused by team involvement in other groups.

Indonesian Journal of Health Administration
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Table 1. Perceived Dimensions of Cohesion in TB Prevention Team in Surabaya City in 2019

Dimensions	Very Unintegrated		Unintegrated		Integrated		Very integrated		Total	
	n	%	n	%	n	%	n	%	N	%
Task Cohesion	0	0.0	1	2.3	36	83.7	6	14.0	43	100
								Mean		3.11
Social Cohesion	0	0.0	3	7.0	38	88.4	2	4.7	43	100
								Mean		2.98
Individual attraction to a group	0	0.0	3	7.0	37	86.0	3	7.0	43	100
								Mean		3.00
Team Cohesion	0	0.0	0	0.0	40	93.0	3	7.0	43	100

Sources: Primary data (Rochmah *et al*., 2020)

Table 2. Perceived Dimensions of Trust in TB Prevention Team in Surabaya City in 2019

Dimensions	No trust at all		Little trust		Moderate trust		Strong trust		Total	
	n	%	n	%	n	%	n	%	N	%
Propensity of trust	0	0	0	0	37	86.0	6	14.0	43	100
								Mean		3.14
Perceived trustworthiness	0	0	0	0	37	86.0	6	14.0	43	100
								Mean		3.14
Cooperative behavior	0	0	0	0	35	81.4	8	18.6	43	100
								Mean		3.19
Monitoring behavior	0	0	0	0	39	90.7	4	9.3	43	100
								Mean		3.09
Team Trust	0	0	0	0	38	88.4	5	11.6	43	100

Sources: Primary data (Rochmah *et al*., 2020)

Table 2 shows that 88.4% of members trust their team. Each dimension has a value of <3.20, which previous research considers a low trust (Rochmah, Lestyoningrum, and Widyacahya, 2020). Trust will contribute to team decision-making. Cooperative behavior has the highest mean value. It can influence members to welcome assistance and advice at work. The lowest mean value is found in the monitoring behavior dimension, although the team members still monitored each other.

Better work performance will come as every member trusts others' ability, integrity, and wisdom in carrying out tasks (McShane, and Von Glinow, 2018). Empirical research defines trust as the willingness of each team member to believe in others (Dyer and Chu, 2003). Trust is lower when members are unprepared for unpredictable circumstances and risks (Yang, 2014).Regarding survival, most teams (86.0%) perceived a good relationship in future work. Its mean value is 3.14, indicating low survival. With diverse professions in the teams, training on TB prevention should be provided to build their teamwork. Teams who have a good relationship with the members will have a significant impact on the implementation of the TB prevention program (Eaton *et al.*, 2017). While for satisfaction, most of the teams (90.7%) felt satisfied with their work.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.188-196

Table 3. The Influence of Cohesion and Trust on Team Effectiveness

Dimensions of Cohesion	Sig.	Standard Coefficient Beta
Task cohesion	0.014**	0.374
Social cohesion	0.180	0.222
Individual attraction to a group	0.919	0.018
Dimensions of Trust		
Propensity of trust	0.433	0.119
Perceived trustworthiness	0.477	0.214
Cooperative behaviors	0.000**	0.558
Monitoring behaviors	0.601	0.091

Team effectiveness as a dependent variable **) significance

The mean value of member satisfaction is lower than 3.20, indicating some unmet needs.

Table 3 illustrates that task cohesion had a significant influence on team effectiveness. The significance value is 0.014 with a beta value of 0.374 indicating the independent variables likely affect the dependent variable. Some teams (37.4%) thought they had task cohesion. While the significance values of social cohesion and individual attraction to a group do not meet the threshold values, the beta coefficient value was meaningless.

The strength of team cohesion will affect team performance (Grossman *et al.* , 2015; Gill, 2017; McShane, and Von Glinow, 2018). The team for TB prevention consists of different professions. Doctors enforce the diagnosis to patients suspected of TB, and nurses must take care of patient treatment (Indonesian Ministry of Health Regulation, 2016). Task cohesion significantly affects interactions between team members in task priority and expressing of opinion (Lyle *et al.*, 1995). The result of this study found that task cohesion impacts team effectiveness significantly. The other study found that task cohesion was changed over time caused by performance proved goal-oriented(Acton, Braun, and Foti, 2020). It is proved that the team should clearly understand the team's goal-oriented. Task cohesion among team members captures the degree of their commitment and focus on the task (Dobrijević, Đorđević Boljanović, Alčaković, and Lazarević, 2020). Table 3 showed that task cohesion's mean value was higher than social cohesion and individual attraction. It means that the prevention TB team has the exact definition of team goal-oriented and focused on the task.

Social cohesion is essential for a team to work harmoniously with the same vision and mission to achieve its main goals (Fonseca, Lukosch, and Brazier, 2019). Social cohesion does not significantly influence team effectiveness in contrast to some studies that found a significant influence of social cohesion on team effectiveness (Carless and Paola, 2014; Grossman *et al.* , 2015; Gill, 2017; McShane, and Von Glinow, 2018). Cohesion is related to the diversity of members and the number of team members (Love, 2018). Social cohesion could trigger team performance. However, social cohesion in this study was low (2.98) due to the various types and number of team members. It is associated with the study that found social cohesion can be influenced by team members' agreeableness and openness (Acton *et al.*, 2020). A team with good agreeableness and openness among members would increase the social cohesion of the team. Due to the various types and number of members in the teams, it would increase the variety of opinions.

Indonesian Journal of Health Administration
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10.20473/jaki.v10i2.2022.188-196

Individual attraction to a group means how members individually and in the group accept interactions and desires between team members (Carless and Paola, 2014). The results showed that individual attraction to a group did not significantly influence team effectiveness. Similarly, previous research found that individual attraction to a group did not significantly influence team effectiveness (Carless and Paola, 2014). Due to multiple other groups' involvement, the teams have no attachment to their members.

Table 3 illustrates the influence of trust on team effectiveness. The cooperative behavior dimension significantly influenced team effectiveness compared to other dimensions. The standard beta coefficient is 0.558 which means that 55.8% of the members perceived their team as having cooperative behaviors. While the other dimension (propensity of trust, perceived trustworthiness, monitoring behaviors) does not influence because of its significant value of more than 0.05.

Cooperative behaviors relate to the willingness of team members to synergize at work (Castro, 2014). With trust, team members may have interpersonal relationships at community and institutional levels (Costa, 2005). Trust determines team performance (Costa, Fulmer and Anderson, 2018).

Trust relates directly to health care users; thus, teams should commit to performing good services (Hall *et al.* , 2001). Trust likely leads to good member coordination (Bond-Barnard, Fletcher and Steyn, 2018). Trust is important for teams with various types of professions and several people. However, other research showed that trust did not significantly influence the team size in the TB control program (Rochmah, Lestyoningrum and Widyacahya, 2020).

Team leaders ensured workflow by assigning tasks to each team member. However, the teams faced some problems in terms of various numbers of professions and work incompetency. Some members had background knowledge of TB prevention, while others did not. Recognition is also an important factor in organizations despite pseudo teams (Havig *et al.*, 2013). The teams were given a lot of workloads that were not related to the prevention TB program. Thus, members may not be performing a task with focus. It is a special note and becomes a bias of this study.

In general, this study only focused on whether cohesion and trust influence team effectiveness or not, but it did not include other factors (such as individual, social and regulatory factors), deemed to influence team effectiveness.

Conclusion

Task cohesion and cooperative behavior had a significant impact on team effectiveness. It is recommended to the Surabaya City Health Office to collaborate with the PHC management to evaluate the teamwork of the preventing TB team through in-depth interviews or other methods to get the problem in the team. Teams with strong integration and trust likely have a greater chance of building an effective team. Capacity building should be done to improve worker performance and allow workers to know each other and build the same visions and missions. Furthermore, it is recommended for future research to search more about the determinant factors that influence the cohesion and trust of the health care team.

Abbreviations

PHC: Primary Health Care; Sig.: Significance; TB: Tuberculosis; WHO: World Health Organization.

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Declarations

Ethics Approval and Consent Participant

This study has obtained an ethical clearance approved by the Health Research Committee, Faculty of Nursing, Universitas Airlangga (No. 1316-KEPK). Respondents were informed about the research objectives and purposes, and they submitted verbal consent to participate in the study.

Conflict of Interest

The authors declare that there are no significant competing financial, professional, or personal interests that might have affected this study.

Availability of Data and Materials

Data and material research can be provided upon request.

Authors' Contribution

SDL conceptualized the study and the methodology; SDL created the methodology, analyzed the data, wrote, reviewed, and edited the original draft and manuscript; YP and DRF analyzed the data, wrote and reviewed the manuscript.

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Original Research

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HUSBAND'S SUPPORT IN WIFE'S ANC IN EASTERN INDONESIA: DO REGIONAL DISPARITIES EXIST?

Dukungan Suami dalam ANC Istri di Timur Indonesia: Adakah Disparitas Antar Wilayah?

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Abstract

Background: Previous research has found that husband support can increase the participation of the wife's antenatal care (ANC) to prevent an increase in maternal mortality. Meanwhile, in the eastern region, the effort to provide pregnant women's health services tends to be lower than in Indonesia's other areas.
Aims: The study analyzed regional disparities of husbands' support in wives' ANC in eastern Indonesia.
Methods: Secondary data from the 2017 Indonesian Demographic and Health Survey were used in the study. In eastern Indonesia, the analytic units were wives aged 15 to 49, married, and pregnant in the previous five years. The study analyzed 2,005 respondents as a sample. In addition to the husband's support, the study examined region (province), residence, age, education, occupation, wealth, and parity as the independent variable. In the final stage, the study used a binary logistic regression test.
Results: A husband in East Nusa Tenggara has 1.556 times the probability of a husband in Papua for a support wife's ANC (95% CI 1.082-2.237). Maluku husbands are 0.528 times less likely to support their wife's ANC than Papua husbands (95% CI 0.363-0.768). North Maluku husbands are 0.476 times less likely than Papua husbands to support their wife's ANC (95% CI 0.320-0.709). Meanwhile, there was no significant difference in the husband's support between West Papua and Papua.
Conclusion: Regional disparities of husband's support in wife's ANC existed in eastern Indonesia.

Keywords: husband's support, maternal health, antenatal care, family factors.

Abstrak

Latar Belakang: *Studi sebelumnya menemukan bahwa dukungan suami dapat meningkatkan partisipasi istri dalam ANC untuk mencegah peningkatan kematian ibu. Sementara di wilayah timur, upaya penyelenggaraan pelayanan kesehatan ibu hamil cenderung lebih rendah dibandingkan wilayah Indonesia lain.*
Tujuan: *Tujuan studi untuk menganalisis disparitas regional dukungan suami pada ANC istri di Indonesia Timur.*
Metode: *Penelitian menganalisis data Survei Demografi dan Kesehatan Indonesia 2017. Unit analisis adalah pasangan dengan istri berusia 15-49 tahun, menikah, dan hamil selama lima tahun terakhir. Studi menganalisis 2.005 responden. Selain dukungan suami, penelitian ini menganalisi wilayah (provinsi), tempat tinggal, umur, pendidikan, pekerjaan, status kekayaan, dan paritas sebagai variabel bebas. Tahap akhir penelitian menggunakan uji regresi logistik biner.*
Hasil: *Suami di Nusa Tenggara Timur memiliki peluang 1,556 kali lipat kemungkinan suami di Papua untuk mendukung ANC istri (95%CI 1,082-2,237). Suami di Maluku 0,528 kali lebih rendah mendukung ANC istri dibandingkan suami di Papua (95%CI 0,363-0,768). Suami di Maluku Utara 0,476 kali lebih rendah mendukung ANC istri dibandingkan suami di Papua (95% CI 0,320-0,709). Sedangkan dukungan suami antara Papua Barat dan Papua tidak ada perbedaan yang signifikan.*
Kesimpulan: *Ada disparitas regional pada dukungan suami dalam ANC istri di kawasan Timur Indonesia.*

Kata kunci: *dukungan suami, kesehatan ibu, antenatal care, faktor keluarga.*

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Introduction

The maternal mortality rate (MMR) indicates the success of women's health efforts (Indonesian Ministry of Health, 2019). MMR is the ratio of a woman's death during pregnancy, childbirth, or within 42 days after delivery per 100,000 live births caused by pregnancy, childbirth, and the puerperium or its management (Indonesian Ministry of Health, 2019; World Bank, 2021). MMR in Indonesia from 2013 to 2014 has tended to decline but has not yet reached the target of the Sustainable Development Goals of 70,000 per 100,000 live births (Susiana, 2015; World Bank, 2021). MMR in 2017 in Indonesia was 177.00 per 100,000 live births, down 3.8% from 2016. In 2016 it was 184.00 per 100,000 live births, down 4.17% from 2015 (World Bank, 2021). Indonesia has the thirdhighest MMR among ASEAN countries after Myanmar and Laos (World Health Organization and UNICEF, 2019).

One of the strategies to reduce MMR is to provide qualified ANC services. ANC can detect early complications, provide appropriate intervention if midwives/ob-gyn find difficulties, and educate pregnant women about well-being, childbirth preparedness, and breastfeeding (Utami *et al.*, 2020). Economic concerns, distance, transportation difficulties to health facilities, a lack of information, and family support, particularly from their husband, are some factors that restrict women from receiving or seeking care during pregnancy and childbirth (Dahab and Sakellariou, 2020). Previous studies have found that poor spouses' support and involvement in the prenatal and delivery phases is one of the ANC obstacles. Women postpone maternal health treatment due to a lack of authorization from their spouses (Gize *et al.*, 2019; Uldbjerg *et al.*, 2020). Husbands' willingness to accompany their spouses to medical appointments correlates positively with maternal and neonatal health care (Rahman *et al.*, 2018; Sakuma *et al.*, 2019).

Other factors influencing social background and cultural practices include local traditions that the community still practices during pregnancy. Of the care pattern for pregnant women, 61% always combine traditional and modern methods, and 11% fully believe and only rely on conventional approaches (Pratiwi *et al.*, 2019).

The husband was a leader and, most importantly, supported when a woman was pregnant. As the family head, men manage resources, consult on pregnant women's care, and are in authority over where and when pregnant women should reach medical assistance (Wulandari, Laksono and Matahari, 2022). Several studies have reported that a husband's support positively impacts encouraging pregnant women to attend ANC visits. The husband's role also positively affects the delivery process and choosing of skilled birth attendants (Lestari *et al.*, 2019). The situation can include financial support, accompanying ANC visits, setting up a place for delivery, and making decisions (Marzo *et al.*, 2018).

Indonesia is currently facing three health problems. First is the uneven and inadequate infrastructure. Existing health service facilities in Indonesia are still centralized in big cities. Second, the distribution of health workers is not evenly distributed, especially specialist doctors. The third is the funding allocation for the health sector in the amount of 2.4% of the Regional Revenue and Expenditure Budget funds (Amelia, 2020). This problem causes health development in Indonesia to be uneven. Health development in eastern Indonesia has lagged behind other areas. Health Development in Eastern Indonesia has shallow indicators of healthy families, namely in East Nusa Tenggara, Maluku,

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North Maluku, West Papua, and Papua provinces (Ipa *et al.*, 2020; Laksono *et al.*, 2021). ANC utilization in eastern Indonesia shows that almost all areas have a gap with Papua, except Maluku (Laksono, Rukmini and Wulandari, 2020). Previously, no researcher had analyzed this topic. Based on the background narration, the study analyzes regional disparities of husbands' support in wives' ANC in eastern Indonesia. determined age by the respondents' acknowledgments of their husbands' most recent birthdays.

Method

Data Source

The study analyzed the 2017 Indonesian Demographic Data Survey (IDHS) data. The analysis units were couples of childbearing age, with the inclusion criteria of couples with wives aged 15-49 who got pregnant in the last five years before the interview. The survey used stratification and multistage random sampling and obtained 2,005 samples. The study used the wife as respondents.

Variables

The outcome variable was the husbands' support. The study defines husbands' support as the respondents' acknowledgments of husbands' participation during ANC. The study obtained variables from one question: Does the husband accompany the wife in antenatal care? The husband's support consists of no and yes.

The study used regions as an exposure variable. The study determined regions based on provincial administrative boundaries. Furthermore, the area comprises five provinces: East Nusa Tenggara, Maluku, North Maluku, West Papua, and Papua (Wulandari and Laksono, 2020).

Meanwhile, six variables as control variables consist of the type of residence, age, education level, occupation, wealth status, and wife's parity. The study divided places into urban and rural. The study

Education comprises no education, primary, secondary, or higher education. The occupation includes unemployed, professional/ technical, managers/ administrators, clerical, sales, services, agricultural self-employed, industrial workers, and others. The parity comprises primiparous (<2), multiparous (2-4), and grand multiparous (>4).

The survey evaluates household wealth based on furniture types and prices. It includes a TV, a bicycle, a car, and family items such as drinking water sources, bathroom amenities, and flooring materials. Furthermore, the principal component analysis was used to calculate the value of this variable. The country's wealth quintiles were developed based on individual household scores and then grouped into the same five categories, which account for 20% of the population (Wulandari *et al.*, 2019). The wealth status comprises five classes: poorest, poorer, middle, richer, and richest.

Data Analysis

In the first step, the researcher analyzed the bivariate method to observe regional disparities in all investigated variables. The study used chi-square to select the dichotomous variables at this step, while the continuous variables were tested using the T-test. In the last stage, the researcher used binary logistic regression to examine the odds ratio between regions.

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Table 1. Descriptive statistic of Husband's Support in Wife's ANC in Eastern Indonesia

Characteristics	Province					p-value
	East Nusa Tenggara (n=743)	Maluku (n=562)	North Maluku (n=344)	West Papua (n=172)	Papua (n=184)	
Husband's support						*<0.001
- No	40.9%	51.2%	58.4%	42.4%	40.2%	
- Yes	59.1%	48.8%	41.6%	57.6%	59.8%	
Residence						*<0.001
- Urban	19.5%	45.9%	25.3%	30.2%	23.9%	
- Rural	80.5%	54.1%	74.7%	69.8%	76.1%	
Age (mean)	35.06	34.47	34.49	33.95	34.69	*<0.001
Education						*<0.001
- No education	5.9%	1.1%	1.5%	0.6%	3.8%	
- Primary	40.4%	18.3%	20.9%	14.5%	21.2%	
- Secondary	40.1%	62.6%	63.1%	65.1%	60.3%	
- Higher	13.6%	18.0%	14.5%	19.8%	14.7%	
Occupation						*<0.001
- not work	1.6%	2.5%	1.7%	2.3%	2.7%	
- Professional/technical	8.1%	14.9%	7.8%	15.7%	10.3%	
- Managers-Administration	2.2%	3.6%	2.6%	2.9%	2.2%	
- Clerical	6.7%	7.7%	5.5%	11.6%	11.4%	
- Sales	6.3%	5.9%	6.4%	7.6%	10.3%	
- Services	12.4%	21.7%	17.4%	19.2%	21.7%	
- Agricultural-self employed	42.9%	27.4%	40.7%	23.8%	25.0%	
- Industrial worker	18.4%	15.5%	16.6%	15.7%	14.1%	
- Other	1.3%	0.9%	1.2%	1.2%	2.2%	
Wealth						*<0.001
- Poorest	79.0%	48.9%	60.5%	39.5%	52.2%	
- Poorer	12.7%	21.7%	17.2%	20.9%	19.0%	
- Middle	3.8%	12.6%	11.6%	19.2%	10.3%	
- Richer	2.3%	11.7%	8.4%	13.4%	9.8%	
- Richest	2.3%	5.0%	2.3%	7.0%	8.7%	
Parity						0.050
- Primiparous	26.9%	24.4%	25.9%	29.7%	19.6%	
- Multiparous	56.8%	57.8%	61.0%	57.0%	56.5%	
- Grand multiparous	16.3%	17.8%	13.1%	13.4%	23.9%	

Note: *p < 0.001.

Result and Discussion

Table 1 displays the descriptive statistics of the husband's support of his wife's ANC in Eastern Indonesia. Table 1 informs husbands in East Nusa Tenggara, West Papua, and Papua ruled husbands who support their wives' ANC. Otherwise, husbands in Maluku and North Maluku do not support the wife's ANC.

Couples living in rural areas are prevalent in the entire region based on the type of residence. Meanwhile, according to age, husbands in West Papua have the youngest average age. Husbands with secondary education are prominent in all areas based on education level, except in East Nusa Tenggara, where husbands with primary education dominate. According to occupation type, husbands with agricultural groups are influential in the five regions.

The most impoverished family is influential in all research areas based on wealth status. On the other hand, a husband who has multiparous wives dominates in all regions.

Table 2 shows the binary logistic regression test results—the analysis used "Husband's Support in Wife's ANC=no" as a reference. Husbands in East Nusa

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Tenggara are 1.556 times more likely than husbands in Papua to support their wife's ANC (95%CI 1.082-2.237). Husbands in Maluku are 0.528 times less likely than husbands in Papua to support their wife's ANC (95%CI 0.363-0.768). Husbands in North Maluku are 0.476 times less likely than husbands in Papua to support their wife's ANC (95%CI 0.320-0.709). Meanwhile, there was no significant difference in the husband's support between West Papua and Papua.

Previously, the author had not found any research that discussed regional disparities of husbands' support in their wife's ANC, especially in the east of Indonesia. As in Indonesia, the five regions' social context generally has a patriarchal social system, which tends to place men as more dominant (Sakina and A., 2017). This patriarchal social system places a woman's pregnancy and cares as a domestic matter, which is the woman's responsibility. So, it becomes a challenge to involve men in pregnancy care efforts.

A previous study shows the eastern zone lags behind its western counterpart, particularly when compared to Java, which serves as the government's seat of power (Mubasyiroh, Nurhotimah and Laksono, 2016). In contrast to the west side, eastern Indonesia's topography shows more extreme heterogeneity. Certain regions of the eastern region are known as rural or remote areas, owing to the minimal road

Table 2. Binary logistic regression of Husband's Support in ANC in Eastern Indonesia

Predictors	Husband's Support in Wife's ANC			
	p-value	AOR	95% CI	
			Lower Bound	Upper Bound
Province: East Nusa Tenggara	*0.017	1.556	1.082	2.237
Province: Maluku	**0.001	0.528	0.363	0.768
Province: North Maluku	***<0.001	0.476	0.320	0.709
Province: West Papua	0.092	0.674	0.425	1.067
Province: Papua (ref.)	-	-	-	-
Type of Place of Residence: Urban	0.230	1.165	0.908	1.497
Type of Place of Residence: Rural (ref.)	-	-	-	-
Age	**0.005	0.982	0.970	0.994
Education: No education (ref.)	-	-	-	-
Education: Primary	0.066	1.720	0.965	3.067
Education: Secondary	**0.003	2.397	1.344	4.276
Education: Higher	***<0.001	4.388	2.287	8.421
Occupation: Did not occupation (ref.)	-	-	-	-
Occupation: Professional/Technical	0.270	1.515	0.724	3.174
Occupation: Managerial and Administration	0.354	1.540	0.618	3.838
Occupation: Clerical	0.426	1.364	0.635	2.929
Occupation: Sales	0.248	1.581	0.727	3.437
Occupation: Services	0.388	1.370	0.671	2.799
Occupation: Agricultural - self-employed	0.574	1.224	0.605	2.477
Occupation: Industrial	0.364	1.393	0.680	2.854
Occupation: Other	0.810	1.146	0.375	3.501
Wealth: Poorest (ref.)	-	-	-	-
Wealth: Poorer	***<0.001	2.027	1.531	2.684
Wealth: Middle	***<0.001	3.730	2.548	5.459
Wealth: Richer	***<0.001	5.014	3.176	7.917
Wealth: Richest	***<0.001	5.194	2.733	9.871

Note: ∗p < 0.05; ∗∗p < 0.01; ∗∗∗p < 0.001.

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infrastructure and public transit available. Some other places are tough to access (Soewondo *et al.*, 2019).

Maluku and North Maluku tend to have a more extreme topography than the other provinces because of their geographic archipelago conditions. Meanwhile, Papua and West Papua are known as areas with unspoiled wilderness, and Papua is also directly adjacent to Papua New Guinea. The two regions in one large island tend to be left behind because there are still many isolated areas (Laksono and Wulandari, 2021). The eastern region has more health myths, making it difficult for health professionals to improve maternal health (Laksono and Faizin, 2015).

Meanwhile, the result found three control variables influencing the husband's support for the ANC: age, education, and wealth. Age as one predictor of the husband's support is in line with a study in Southern Ethiopia, and the situation is related to the partner's need for support and care. A couple older than the wife's age means that a pregnant wife needs attention and help in pregnancy. A husband's support can reduce maternal mortality and stress and strengthen fathers' future role in caring for children (Mamo *et al.*, 2021).

Husbands with secondary education are 2.397 times more likely than no education to support their wife's ANC (95%CI 1.344-4.276). Husbands with higher education are 4.388 times more likely than no education to support their wife's ANC (95%CI 2.287-8.421).

A previous study shows that someone with minimal knowledge will impact a lack of information about access to health services, including ANC (Mohammed *et al.*, 2019). The level of education is linear with women's knowledge and skill to bargain with their partners (Rumaseuw *et al.*, 2018). The husband's involvement is crucial in ANC because we hope the husband will get good maternal information from health workers to improve pregnancy and birth (Jones *et al.*, 2021).

Table 2 shows the poorer husband was two times more likely than the most impoverished to support the ANC (95%CI 1.531-2.684). Husbands with middle wealth status have a 3.730 times higher probability than the most destitute to support the ANC (95%CI 2.548-5.459). Meanwhile, a more prosperous husband was 5.014 times more likely than the most impoverished to support the ANC (95%CI 3.176-7.917). Moreover, the richest have a 5.194 times higher probability than the poorest of supporting the ANC (95% CI 2.733-9.871).

Low socioeconomic families will have deficient access to health services, including pregnancy examinations. The situation is because families with low economic status must have a priority scale to meet their basic needs (Omar, M and Musili, 2020).

Study Limitation

Due to the utilization of secondary data, the situation makes the phenomenon obtained superficial. The study results cannot capture more profound phenomena related to the social and cultural systems surrounding Indonesia's context founded in a previous study (Pratiwi *et al.*, 2019). Further studies with a qualitative approach are needed to uncover this phenomenon.

Conclusion

Regional disparities of husband's support in wife's ANC existed in eastern Indonesia. Husbands in East Nusa Tenggara are the most likely to support the ANC. On the other hand, a husband in Maluku and North Maluku has the lowest likelihood of being a supportive ANC.

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10.20473/jaki.v10i2.2022.197-205

Besides, there was no significant difference in the husband's support between West Papua and Papua.

Moreover, the study also found three control variables influencing the husband's support for the ANC. Age, education, and wealth were the three factors.

Based on the results, the study recommended that policymakers need more attention to archipelagic areas such as Maluku and North Maluku. Policymakers must develop a policy strategy by considering the region's geographical factors.

Abbreviations

MMR: Maternal Mortality Rate; ANC: Antenatal Care; IDHS: Indonesian Demographic Data Survey; ICF: Inner City Fund; AOR: Adjusted Odds Ratio; PHC: Primary Health Care.

Declarations

Ethics Approval and Consent Participant

The 2017 IDHS passed the ethical test and received ethical clearance from the Ministry of Health. The identities of the respondents were all removed from the database. Respondents have given their written consent to participate in this study. The researcher granted permission to use data for this study via https://dhsprogram.com.

Conflict of Interest

The authors state that there were no substantial conflicting financial, professional, or personal interests that could have influenced the performance.

Availability of Data and Materials

The authors are unable to disclose the data publicly because a third party and the authors do not have authorization to do so. Researchers who match the criteria for access to secret data can obtain the 2017 IDHS data at https://dhsprogram.com/data/new-userregistration.cfm.

Authors' Contribution

ADL developed the study's concept; RDW developed the methodology; NR and RM wrote, reviewed, and evaluated the manuscript; ADL created the original draft.

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Original Research

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EXPLORATION OF DISTRICT-LEVEL INNOVATIONS TO ADDRESS MATERNAL AND NEONATAL MORTALITY IN INDONESIA

Eksplorasi Inovasi Tingkat Kabupaten untuk Mengatasi Kematian Ibu dan Neonatus di Indonesia

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Abstract

Background: The Indonesian maternal and neonatal mortality rates remain some of the highest in Southeast Asia.
Aims: This study aims to assess and compare district-level innovations that address maternal and neonatal mortality.
Methods: This was a qualitative study conducted via FGDs in eight selected districts in November 2021. Data obtained were analyzed using the WHO health system building blocks framework.
Results: The study found high variation in districts' innovations ranging from expansion of service for maternity waiting homes to periodical obstetrician visits at Puskesmas. A majority of districts use a local approach as the basis for innovation. Some innovations are modifications of the national program or initiated purely by District Health Offices, Puskesmas, and the community. Many interventions are based on multisectoral commitment, community participation, and targeting to strengthen health service delivery. Leadership and health financing also have an influence on the implementation of these innovations.
Conclusion: The multitude of innovations reflects a high variation in barriers to reducing maternal and neonatal mortality that need to be addressed at the district level. A routine forum to share districts' best practices is warranted. Additionally, family-based surveillance for neonatal danger signs, monitoring for pregnant women and neonates via WhatsApp, and zoning systems for referrals to healthcare facilities in larger districts are innovations identified in this study that have potential to be replicated in other districts or expanded nationally.

Keywords: district-level innovation, maternal and neonatal health, maternal mortality, neonatal mortality

Abstrak

Latar Belakang: *Angka kematian ibu dan neonatus di Indonesia masih menjadi salah satu yang tertinggi di kawasan Asia Tenggara.*
Tujuan: *Studi ini bertujuan untuk mengkaji dan membandingkan inovasi tingkat kabupaten yang menangani kematian ibu dan neonatus.*
Metode: *Studi kualitatif ini dilaksanakan melalui FGD di 8 kabupaten terpilih pada November 2021. Data yang didapatkan dianalisa sesuai dengan kerangka kerja* Health System Building Blocks *WHO.*
Hasil: *Penelitian ini menemukan variasi yang tinggi dalam inovasi masing-masing kabupaten/kota, mulai dari perluasan layanan di rumah tunggu bersalin hingga kunjungan dokter kandungan berkala di Puskesmas. Mayoritas kabupaten/kota menggunakan pendekatan spesifik lokal sebagai dasar inovasi. Beberapa inovasi murni diprakarsai oleh Dinas Kesehatan, Puskesmas, dan masyarakat, serta modifikasi program nasional. Banyak intervensi yang didasarkan pada komitmen multisektoral, partisipasi masyarakat, juga bertujuan untuk memperkuat pemberian layanan kesehatan. Kepemimpinan dan pembiayaan kesehatan juga berpengaruh dalam implementasi inovasi tersebut.*
Kesimpulan: *Banyaknya inovasi mencerminkan tingginya variasi dari hambatan dalam menurunkan angka kematian ibu dan bayi baru lahir yang perlu ditangani di tingkat kabupaten/kota. Forum rutin di mana kabupaten dapat berbagi praktik terbaik sangat diperlukan. Selain itu, surveilans tanda bahaya neonatal berbasis keluarga, pemantauan ibu hamil dan neonatus melalui WhatsApp, dan sistem zonasi rujukan ke fasilitas kesehatan di wilayah kabupaten yang besar merupakan inovasi yang diidentifikasi dalam studi ini yang memiliki berpotensi untuk direplikasi di kabupaten lain atau diperluas secara nasional.*

Kata kunci*: inovasi kabupaten, kematian ibu, kesehatan ibu dan bayi baru lahir, kematian bayi baru lahir*

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Introduction

Maternal and neonatal death remain a large issue in Indonesia. Indonesia has one of the highest maternal mortality ratios (MMR; 177 deaths per 100,000 live births) and neonatal mortality rates (NMR; 12.4 deaths per 1,000 live births) in the Southeast Asia region (World Health Organization, 2019, 2020, 2022). As there is less than a decade to achieve the target MMR (70 per 100,000 live births) and NMR (12 deaths per 1,000 live births) set in the Sustainable Development Goals (SDGs) (McArthur, Rasmussen and Yamey, 2018), it is important to accelerate the reduction of neonatal and, especially, maternal deaths in Indonesia to meet SDG targets.

The progress in the reduction of MMR has not been proportional when compared to the steady growth in the coverage of maternal services. The annual Indonesia health profile report documented increased maternal service performance from 2016 to 2019, including more antenatal care (ANC) visits, delivery in health care facilities, and delivery assisted by skilled birth attendants. (Kementerian Kesehatan RI, 2017, 2018, 2019, 2020, 2021). Several studies (CFW FPH UI and MCSP, 2018; USAID Jalin Project, 2019) found that the majority of maternal deaths occurred in health facilities, and the most common causes were obstetric hemorrhage and hypertension in pregnancy. This may indicate a low level of early detection during pregnancy and delays in hospital referrals. Similarly, although there has been a steady downward trend in the neonatal mortality rate (NMR), further reduction in NMR is needed so Indonesia can achieve its NMR SDG target. Prematurity and asphyxia are the most common causes of death, and about 70% of deaths happen in hospitals (USAID Jalin Project, 2019).

Most maternal deaths are concentrated in districts on Java and several districts on Kalimantan and Sumatra, while neonatal mortality is more dominant in districts on Java (ThinkWell Institute, 2022), which is in line with the number of people within a region as Java has the highest population. Thus, districts in Indonesia have different burdens when reducing maternal and neonatal mortality. For this reason, each district has its own health innovations tailored to local issues and needs. This is essential because, even if the central government has provided both regulatory and financing support, obstacles are still found in implementation at the subnational level, especially in the era of decentralization. In terms of the health sector, local governments are responsible for the provision of both physical and social health services for the community and the availability of health resources (Articles 15 and 16 of Law No. 36 on Health) (Harimurti, Prawira and Hort, 2017).

Districts are responsible for the Minimum Service Standards (MSS), which is one of the instruments in the implementation of performance-based budgeting which is monitored by the Ministry of Home Affairs (Kementerian Kesehatan RI, 2017). MSS in the health sector contains 12 indicators, including communicable disease-related indicators, non-communicable disease-related indicators, and maternal and neonatal health (MNH)-related indicators. Three MNH-related indicators in MSS are the provision of health services for pregnant women, mothers in labor, and newborns. All MSS indicators target 100% per year and districts must achieve this target. In other words, the central government evaluates each district based on the MSS indicators and considers allowing the transfer of funds to local governments in the following year, as well as providing regional incentive funds. Thus, the achievement of MSS is highly important for districts, and

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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districts should coordinate across sectors to achieve the MSS targets.

In order to achieve the MSS targets, district-level innovation is important. Innovative MNH interventions will need thorough implementation, evaluation, and scale-up strategies for their sustainable integration into health systems (Lunze *et al.*, 2015). Thus, districts need a study related to these innovations so that they can learn and replicate them. Yet, no studies have described and evaluated various district-level innovations that are currently being implemented to reduce maternal and neonatal mortality in Indonesia. This study aims to assess and compare district-level innovations that address maternal and neonatal mortality, identify potential barriers to the implementation of these innovations, and highlight innovations that can potentially be expanded nationally and replicated by other districts.

Method

This study used a qualitative approach for primary data collection through focus group discussions (FGDs). On October 14, 2021, in collaboration with the Directorate of Family Health and other units in the Ministry of Health (MOH), the ThinkWell Institute held a discussion forum as a pilot to assess MNH service program best practices in 14 districts. Afterwards, we carried out an in-depth qualitative study in eight selected districts (Bandar Lampung City, Grobogan Regency, Jayapura City, Jember Regency, Lombok Timur Regency, Manggarai Barat Regency, Palu City, and Sukabumi Regency). Seven out of eight districts were selected based on several criteria including the trend of maternal and/or neonatal death, coverage of MNH services, whether it is an MNH-locus district assigned by MOH, and geographic representativeness. We chose one of eight districts (Jember Regency) because its supply-side readiness was the most ideal based on the availability of four basic emergency obstetric and neonatal care (EmONC) Puskesmas and one comprehensive EmONC hospital (ThinkWell Institute, 2022), but its MMR and NMR remained high.

Four FGDs were conducted in each district in November 2021 for a total of 32. They included four groups of stakeholders: District Health Offices (DHO) and Social Security Management Body for Health, *Badan Penyelenggara Jaminan Sosial Kesehatan* (BPJSK) district offices; local agencies for development planning, district social affairs organizations, and local offices for population and civil registration; health care facilities including public primary health care (PHC), private PHC, midwife practices, and hospitals; and professional organizations including the local midwife association, *Ikatan Bidan Indonesia* (IBI), and local obstetrics and gynecology specialist association, *Perkumpulan Obstetri dan Ginekologi Indonesia* (POGI). For each stakeholder, we invited two individuals to attend the FGDs. Thus, 4 to 12 individuals participated in each FGD session depending on the group of stakeholders interviewed. All FGDs were recorded, and the results are summarized in a matrix containing several topics and their explanations from each district. We completed a cross-district analysis to cover the study objectives based on the following framework for analysis.

Framework for analysis

This study adapted a framework based on the MNH continuum of care framework and the World Health Organization (WHO) health system building blocks (McArthur *et al.*, 2018). District MNH innovations were analyzed by health services used in the program, health

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

workforce, health financing allocation for the program, leadership, government commitment to the program, and role and participation of community (Figure 1). The "medical products and technologies" building block is excluded as it is more appropriate for clinical intervention than programmatic intervention.

Results and discussion

In the eight districts sampled for this study, we found more than 20 innovations, both at the district level and subdistrict level. Based on their significance in the FGDs and discussions with MOH, we highlighted 11 major district-level innovations; a detailed explanation of each innovation can be seen in Table 1. We explored the innovations based on the WHO health system building blocks as explained below.

Health service delivery

We mapped the approach of each district by looking at the levels of health service (hospital, PHC, and community), the continuum of care across the maternity period (pre-pregnancy, pregnancy, delivery, and post-delivery), and the targets of the innovations carried out (pre-pregnancy women, pregnant and delivering women, women after delivery, and neonates). Table 1 identifies whether the innovations are comprehensive and meet the continuum of care.

Seven of the eight districts innovate at the PHC level, five districts at the community level, and four districts at the hospital level. Lombok Timur has innovation across all levels of health service. In terms of maternity stages, seven of the eight districts innovate at the pregnancy stage, four districts at the delivery stage, and five districts at the post-delivery stage. Lombok Timur, Manggarai Barat, and Sukabumi have innovations in all maternity stages. In terms of targets for innovations, all districts target pregnant women and women giving birth. Five districts target pregnant women, women who are giving birth, post-delivery women, and neonates, but none of the eight districts target pre-pregnancy women with their innovations.

Figure 1. Framework for analysis

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

Table 1. District-level innovation and its mapping in health service delivery approaches

District	Innovation	Level of Health Services			Process stages				Target			
		Hospital	Primary Health Care	Community	Pre-pregnancy	During pregnancy	Delivery	Post-delivery	Pre-pregnancy women	Pregnant/ delivering women	Women after delivery	Neonatal
Bandar Lampung	Pregnant mother mentoring through WhatsApp (WA)		V	V		V				V		
Grobogan	District regulation forbidding delivery in private midwife practice		V				V			V		
Jember	a. Extending specialized access to Puskesmas (Gemar Jelita)	V	V			V		V		V	V	V
	b. Pregnant mother mentoring through WA	V	V			V		V		V	V	V
Sukabumi	Referral via WhatsApp using zoning system (SEJIWA)		V	V		V				V		
Lombok Timur	a. Improving referral process with multisectoral approach, (ACSIA)	V	V	V		V	V	V		V	V	V
	b. Family-based surveillance for neonatal danger sign		V	V				V				V
Palu City	Creation of multisectoral taskforce (Satgas K5)		V			V		V		V	V	
Manggarai Barat	a. Improved usage of maternity waiting homes, seven days antepartum and two days post-partum (7H2)			V		V	V	V		V	V	V
	b. Cultural community engagement to accelerate MNH decision-making process in the family (Lonto Leok)			V		V	V			V		
Jayapura City	Extending specialized access to primary health care	V	V			V	V	V		V	V	V

Several reviews have shown that integrating care throughout the lifecycle and building a comprehensive and responsive health system are urgently needed for effective MNH interventions (Kerber *et al.*, 2007; Hardee, Gay and Blanc, 2011). Yet, no district has innovations for the pre-pregnancy stage or targets pre-pregnancy women. This gap represents a loss of opportunity for comprehensive MNH programmatic intervention. The MNH continuum of care can be improved through a combination of well-defined polices and strategies to improve home care practices and health care services throughout the lifecycle, building on existing programs and packages (de Graft-Johnson *et al.*, 2006).

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

Lombok Timur has the most comprehensive innovation at all levels of service throughout the maternal period and targets pregnant women, delivering women, post-delivery women, and neonates, namely by improving the referral process with a multisectoral approach, *Aksi Cepat tanggap Sayang Ibu dan Anak* (ACSIA). In addition to DHOs, other government actors (such as police and military) are actively involved in this innovation which aims to encourage pregnant mothers with high-risk pregnancies to give birth in a health care facility. DHOs determine the targets of innovation by providing a list of all pregnant mothers within a village and providing a notice to high-risk pregnant mothers. In this case, the commitment of local leadership greatly affects the success of this innovation.

District innovations related to health service delivery are associated with improving access and service quality. Sukabumi District's innovation is to create a referral system through zoning which is Puskesmas in a certain catchment area would refer their patients to the hospital within their zone, and WhatsApp groups (called SEJIWA), due to its large geographic area and limited access to refer patient to hospitals. According to Sukabumi District's DHO, this innovation is considered successful because it reduces the waiting time for referrals within a zone from five to six hours to 30 minutes to one hour. In addition to increasing access to referral services, patients receive effective services that are suitable for their needs during the referral process. Studies from other developing countries, such as Nigeria, Malawi, and Tanzania, have consistently shown that referral delay is a main cause of service delay, which majorly contributes to maternal death (Mgawadere *et al.*, 2017; Nassoro *et al.*, 2020; Onah *et al.*, 2009). Distance to health care facilities is also recognized as a significant issue contributing to delay (Mgawadere *et al.*, 2017). Thus, innovations that improve access and reduce waiting times to referral services reduce maternal and neonatal mortality.

Several districts increased the quality of health services through strengthening MNH services with additional services from specialists. Jember District and Jayapura City developed a mentoring and consultation program for obstetric and gynecologic specialists in their respective Puskesmas. The rationale for implementing this innovation is the high MMR in Jember (second highest in East Java), while in Jayapura City the rationale is that there are many mothers who give birth via Cesarean section. In addition to increasing the capacity of doctors at Puskesmas, this program is useful for early detection of high-risk pregnancy so women can get timely and effective referral services. While each district is expected to have at least four EmONC Puskesmas, several studies have reported that Puskesmas' readiness to provide EmONC is still suboptimal with wide variety between regions (Handayani and Achadi, 2018; Mujiati, Lestary, and Laelasari, 2014). Yet, EmONC has been deemed essential in countries with high maternal and neonatal mortality (Otolorin *et al.*, 2015). Thus, there is a need for an innovation to address this issue, which may include extending specialized access to Puskesmas or introducing a scenario modelling tool as planning evidence in eastern Indonesia (Ngana and Karyawati, 2021).

Grobogan District limits the delivery services performed by private midwife practices for quality reasons. This policy was adopted by the DHO, since there is a national midwifery regulation (Law No. 4 of 2019) which contains the requirement for independent midwife practices to have qualified practice facilities and work in

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

groups (Undang-Undang Nomor 4 Tahun 2019 Tentang Kebidanan, 2019); however, this local policy reduces access to health services for those in remote areas who cannot access Puskesmas or hospitals and leads to resistance from independent midwife practices because they cannot provide delivery services. Currently this policy is being reviewed by related stakeholders including the local IBI.

Service delivery innovations are usually combined with elements from other building blocks such as innovative financing models, training of providers, and new technologies (Lunze *et al.*, 2015). The innovations carried out by districts must be supported by local government commitment, adequate health financing, and support from health workers and the community.

Health workforce

The districts we studied optimized their human resources for health (HRH) to run their innovative programs. Bandar Lampung assigns the HRH of the Puskesmas to assist young pregnant and lactating mothers through a WhatsApp group, as well as to monitor high-risk pregnant mothers. This is due to the large number of early marriages that occur in this area, so there are many young mothers who have low levels of maternal knowledge. Manggarai Barat also requires village midwives from Puskesmas to actively conduct home visits to pregnant mothers who are about to give birth (one week before the estimated delivery date) and accommodate their transportation to maternity waiting homes. To support their innovation in community-based MNH interventions, Manggarai Barat and Palu City also optimized Puskesmas personnel through continued engagement with respected local figures there. These innovations are examples of optimizing existing HRH capacity at Puskesmas.

In Jember and Jayapura City, extending specialized access to PHC allows Puskesmas HRH to learn from specialists as Puskesmas may consult specialists for mentorship in difficult cases. Specialists periodically visit Puskesmas outpatient clinics, where midwives, nurses, and general physicians (GPs) directly observe and assist clinical services provided by specialists; this is similar to on-the-job training.

Innovative health workforce approaches address the shortage in human resources by enhancing the knowledge, skills, and competencies of health personnel. In developing countries, many innovative workforce approaches involve novel training programs or approaches to improve the supply side of MNH and expand the scope of existing health worker cadres (Lunze *et al.*, 2015); however, respondents in FGDs conveyed that the current training programs for HRH are not optimal because of high costs, mis-targeting of participants selected to attend, and higher priority given to civil servants (at the cost of excluding private HRH).

Health financing

Various innovative financial programs aim to reduce financial barriers to care and improve coverage and usage of MNH services from either or both the supply side or demand side (Lunze *et al.*, 2015). In Indonesia, there are multiple funding sources for health, including central and local governments, in different types of funding systems and programs. Examples of funding sources are the national health insurance program, *Jaminan Kesehatan Nasional* (JKN); the physical and non-physical Special Allocation Fund, *Dana Alokasi Khusus* (DAK); block grants, *Dana Alokasi Umum* (DAU); and the deconcentration fund, *Dana Dekonsentrasi* (Stein and Dewi, 2020). Stein and Dewi (2020) found that the regulation of these

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

MNH funding flows presents various restrictions or earmarks on the use of funds. In other words, district governments must manage funding optimally by referring to funding guidelines.

On the demand side, even though utilization still needs to be optimized, all districts feel the benefits of JKN which covers the MNH package. Conditional Cash Transfer (CCT) in the Family Hope Program, *Program Keluarga Harapan* (PKH), in which one of the indicators is that pregnant women must use health services, also encourage community access to MNH services.

At the district level, innovations are closely related to the allocated budget. Bandar Lampung and Jayapura City provide special allocations from their local budgets for delivery services for people who do not have insurance. This means *Jaminan Persalinan* (Jampersal) is not used in these areas, neither for maternal services nor for waiting homes and transportation; however, Jampersal funds are important and useful for districts with low budget capacity or with many remote areas. Palu City maximizes all available funding sources, such as DAK for the MNH forum and Jampersal for waiting homes.

Local budget allocation for MNH programs tends to vary according to the needs of each district. For example, Jember uses the local funding to reimburse transportation costs for specialists; Manggarai Barat uses local funding for communication costs in the 7H2 program; and Palu City built incentives for Satgas K5 (a multisectoral taskforce) using provincial budget allocation to increase hospital HRH.

Several districts have policies for allocating village funds to MNH innovation. Grobogan and Jayapura City allocate village funds to mentoring activities and socialization of MNH in the community, while Lombok Timur allocates village funds for a family-based surveillance program, explained in the "Community ownership and participation" section. Village funds are a relatively new funding scheme implemented in 2015; their substantial amounts and relatively flexible mechanisms mean that they can be used according to local needs. District-level policies and monitoring at the Puskesmas or subdistrict levels are needed so that village officials actually allocate village funds to MNH programs.

Other specific funds are obtained by districts and allocated to MNH programs; for example, Jayapura City uses special autonomy funds (*Dana Otonomi Khusus*), and Manggarai Barat receives philanthropic or corporate social responsibility funds to contribute to maternity waiting homes.

Leadership and governance

Innovative leadership and governance initiatives related to the formation of partnerships and the formulation and implementation of national MNH policies are considered part of an enabling environment for MNH and address supply, demand, and quality issues (Lunze *et al.*, 2015).

Local regulation

At the district level, innovations are made and decided by DHOs in seven of the eight districts studied except Bandar Lampung. The Bandar Lampung DHO identified various obstacles at the Puskesmas level, so MNH programs are decided by each Puskesmas who create their own initiatives to address maternal and neonatal mortality. Most Puskesmas conduct pregnant mother mentoring through WhatsApp.

Each district-level innovation is regulated by the district government. This is not only essential as a legal framework in the program being implemented, but also

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

as the basis for funding allocation according to each program.

Partnership formation

Most innovations made by DHOs are cross-sectoral activities that involve other local offices (district social affairs organizations, local planning agencies, etc.), subdistrict offices, village administrators, police forces, military forces, religious figures, traditional figures, and elders to improve MNH conditions. DHOs believe that involving many stakeholders, especially those in the community, will increase the awareness of the importance of maternal and child health.

Several districts also engage with IBIs and POGIs when conducting their innovations. In Lombok Timur, the role of the IBI is to guide, supervise, and train private midwife practices, while in Grobogan there is a memorandum of understanding between DHOs and the IBI to maintain the quality of MNH services. Manggarai Barat and Jember collaborate with their POGIs to provide guidance and consultation in special emergency health centers. In Lombok Timur, there is also POGI emergency training for health workers in hospitals.

Community ownership and participation

Innovative approaches increasingly aim to strengthen community-based health mechanisms that improve links to and structures associated with primary health care. Innovative community ownership and participation approaches are complex, multifactorial interventions which often simultaneously address supply, demand, and quality issues (Lunze *et al.*, 2015).

Lombok Timur conducts family-based surveillance for neonatal danger signs in which the family monitors its newborn for 30 days and fills out a danger sign checklist. If there is a danger sign, the family is asked to immediately contact PHC personnel to seek further care. This innovation empowers families to take responsibility for their children's wellbeing and participate in active surveillance.

In Grobogan, the DHO empowers neighborhoods through the Village Alert program which reports pregnant women to PHCs, as well as helps contact health facilities when women are giving birth. Through this program, the village community is encouraged to look after other individuals, specifically pregnant women, and prepare a mode of transportation for pregnant women's referrals.

Scaling up district-level innovations

Table 2 provides the expansion potential for district-level innovations. Innovations can be replicated by other districts (marked +) or adopted into the national program (marked ++). Districts that have certain characteristics like large coverage areas, remote areas, or limited HRH personnel like specialists can replicate innovations from Sukabumi, Palu City, Jayapura City, Lombok Timur, and Manggarai Barat.

The programs for pregnant mother mentoring carried out in Bandar Lampung and Jember have the potential to be adopted at the national level because they are in line with the current national program (Pregnant Mother Class). Also, family-based surveillance for neonatal danger signs has been adopted by MOH.

Study limitations

There are several limitations in this study. Our study did not independently assess whether there was a reduction of maternal and neonatal mortality caused by district-level innovations. Instead, we relied on information provided by stakeholders at the district level. Moreover, innovation identified in this study is limited to districts that were selected as samples, hence there may be successful innovations in other Indonesian districts that we did not identify.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

Table 2. Expansion potential for district-level innovations

	Name of Innovation	Expansion potential
Bandar Lampung City	Pregnant mother mentoring through WhatsApp	++ (Offline pregnant mother mentoring already exists in the form of the Pregnant Mother Class)
Grobogan District	District regulation forbidding delivery in private midwife practices	- (Pushback from IBI)
Jayapura City	Extending special access to Puskesmas	+ (Highly beneficial to districts with little specialized care)
Jember District	Extending specialized access to Puskesmas (*Gerakan Masyarakat Jember Peduli Ibu Hamil dan Balita: Gemar Jelita)*	+ (Highly beneficial to districts with little specialized care)
	Pregnant mother mentoring through WhatsApp	++ (Offline pregnant mother mentoring already exists in the form of the Pregnant Mother Class)
Lombok Timur District	Improving the referral process with a multisectoral approach, *Aksi Cepat tanggap Sayang Ibu dan Anak* (ACSIA)	+ (Highly beneficial in districts with commitments from multisectoral actors)
	Family-based surveillance for neonatal danger signs	++ (Has been replicated nationally)
Manggarai Barat District	Improved usage of maternity waiting homes seven days antepartum and two days post-partum (7H2)	+ (Highly beneficial in districts with remote access to health care facilities; these are a replication from similar innovations in Flores)
	Cultural community engagement to accelerate MNH decision-making process to the family (Lonto Leok)	- (Specific to local culture in Manggarai Barat)
Palu City	Creation of multisectoral taskforce (*Satgas* K5)	+ (Highly beneficial in districts with commitments from multisectoral actors)
Sukabumi District	Referral via WhatsApp using zoning system, *Sistem Jejaring Inovasi WA Grup Zonasi* (SEJIWA)	+ (Highly beneficial in districts with wide areas)

Conclusion

It is urgent that national and local governments make a concerted effort to reduce MMR and NMR. During our study, we observed high variation in district innovation which may reflect heterogeneity in district capacities and local barriers to reducing maternal and neonatal death. Several recommendations can potentially accelerate the reduction of maternal and neonatal mortality:

Health service (Comprehensive, continuum-of-care interventions in all parts of health services, processes, and targets).

Health workforce (A national HRH policy that allows civil servants to take part in competency improvement training, compulsory, and affordable midwifery trainings organized by IBI to ensure that all private midwives can attend training and improve service quality).

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.206-218

Health financing (Greater regulatory clarity and socialization of JKN benefits to those patients that it does and does not cover to contribute to regulatory conformity between local and central government).

Leadership and governance (A routine national forum for all districts and cities to share successful innovations in reducing MMR and NMR (benchmarking) as well as an adjustment of policy and goal setting at the district level during Covid-19).

Community ownership and participation (Involving village stakeholders, religious leaders, and community leaders in MNH program innovation to strengthen community participation).

This study also recommends several district-level innovations to be scaled up or replicated by other districts or the national government including family-based surveillance for neonatal danger signs (Lombok Timur), monitoring for pregnant women and neonates via WhatsApp (Jember, Bandar Lampung), and zoning systems for referrals to health care facilities in larger districts (Sukabumi).

Abbreviations

ACSIA: *Aksi Cepat tanggap Sayang Ibu dan Anak*; ANC: Antenatal Care; BPJSK: *Badan Penyelenggara Jaminan Sosial Kesehatan*; CCT: Conditional Cash Transfer; DAU: *Dana Alokasi Umum*; DHO: District Health Office; EmONC: Emergency Obstetric and Neonatal Care; FGD: Focus Group Discussion; GP: General Physician; HRH: Human Resources for Health; IBI: *Ikatan Bidan Indonesia*; Jampersal: *Jaminan Persalinan*; JKN: *Jaminan Kesehatan Nasional*; MMR: Maternal Mortality Rate; MNH: Maternal Neonatal Health; MOH: Ministry of Health; MSS: Minimum Service Standards; NMR: Neonatal Mortality Rate; PHC: Primary Health Care; PNC: Postnatal Care; POGI: *Perkumpulan Obstetri dan Ginekologi Indonesia*; SDG: Sustainable Development Goal; SEJIWA: *Sistem Jejaring Inovasi WA Grup Zonas*i; WA: WhatsApp; WHO: World Health Organization.

Declarations

Ethics Approval and Consent Participant

Respondents were addressed before the survey about the survey's objectives and purposes and gave verbal consent to participate in the study.

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

Availability of Data and Materials

The data used for this study is available from the corresponding author upon reasonable request.

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Authors' Contributions

HM and T conceptualized the study; T, S, and AB created the methodology; NM, NA, WN, D, F, MN, NKP, and T wrote, reviewed, and edited the manuscript; HM and ES wrote the original draft.

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Original Research

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COVID-19 MOLECULAR-BASED TESTING CAPACITY IN FIVE CUSTOMARY AREAS OF PAPUA

Kapasitas Pemeriksaan Swab Covid-19 Berbasis Molekuler di Lima Wilayah Adat Papua

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Abstract

Background: Covid-19 (Corona Virus Disease-19) emerged at the end of December 2019, and the current gold standard for Covid-19 testing is molecular-based virus detection with Real Time-Polymerase Chain Reaction (RT-PCR) and Rapid Molecular Test (RMT). In the early of this pandemic, Indonesia, especially Papua, still had difficulty in examining Covid-19.
Aims: This study aimed to identify the Covid-19 molecular-based testing capacity of laboratories from various regencies representing five customary areas of Papua in the early pandemic.
Methods: This cross-sectional descriptive study with purposive sampling method collected primary data and secondary data from the Papua Provincial and Regency Covid-19 Response Acceleration Task Force and the representative hospitals in five customary areas of Papua (Saireri, Ha anim, Mee Pago, Lapago, Mamta) in May-June 2020.
Results: The Covid-19 molecular-based testing capacity in Papua has yet to be maximum in the early pandemic.
Conclusion: The Covid-19 molecular-based testing capacity has yet to reach its maximum capacity in the beginning of the pandemic. Regency, which applies the GeneXpert test, is recommended to supply RT-PCR. RT-PCR can be procured in several cities/regencies within one customary area, and samples of the specimens can be delivered more quickly in the same area.

Keywords: Covid -19, Papua, RT-PCR

Abstrak

Latar Belakang: *Covid-19 merupakan penyakit yang muncul pada akhir Desember 2019 dan standar pemeriksaan Covid-19 tercanggih hingga saat ini adalah deteksi virus berbasis molekuler dengan Real Time- Polymerase Chain Reaction (RT-PCR) dan Tes Cepat Molekuler (TCM). Pada awal pandemi, Indonesia, khususnya Papua masih kesulitan dalam melakukan pemeriksaan Covid-19.*
Tujuan: *Penelitian ini bertujuan untuk melihat kemampuan laboratorium dalam melakukan pemeriksaan Covid-19 berbasis molekuler dari berbagai kabupaten yang mewakili lima wilayah adat Papua pada masa awal pandemi.*
Metode: *Penelitian deskriptif potong-lintang ini menggunakan metode purposive sampling dengan mengumpulkan data primer dan data sekunder dari Gugus Penanganan Covid Provinsi dan Kabupaten serta Rumah Sakit perwakilan di lima wilayah adat Papua (Saireri, Ha anim, Mee Pago, Lapago, Mamta) pada bulan Mei-Juni 2020.*
Hasil: *Kapasitas pemeriksaan Covid-19 berbasis molekuler di Papua belum maksimal pada awal pandemi.*
Kesimpulan: *Kapasitas pemeriksaan Covid-19 berbasis molekuler belum maksimal. Kabupaten yang hanya memiliki GeneXpert disarankan untuk menyuplai RT-PCR. Pengadaan RT-PCR dapat dilakukan di beberapa kota/kabupaten dalam satu wilayah adat sehingga pengiriman sampel dapat dilakukan dengan lebih cepat pada wilayah yang sama.*

Kata kunci*: Covid-19, Papua, RT-PCR*

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Introduction

The Covid-19 pandemic due to the SARS-CoV2 virus (Severe Acute Respiratory Syndrome Coronavirus-2) is a global's health issue, impacting all aspects of life, such as education, tourism, economy, and others. Covid-19 was first detected in Wuhan, Hubei province, China, and quickly spread to other countries in a short period. The spread has threatened global public health. Covid-19 mainly affects the respiratory system with primary symptoms such as anemia, fever, cough, chest pain, flu, and fatigue. Besides, it affects the cardiovascular, gastrointestinal, nervous system, and renal. Covid-19 can infect people of all ages, both young and old (Agustina and Fajrunni'mah, 2020; Chilamakuri and Agarwal, 2021; Krishnan *et al.*, 2021; Leonard *et al.*, 2021). Older people, especially 65 years old and older, are more at risk for Covid-19 infection (Brooke and Jackson, 2020; Heid *et al.*, 2021). Covid-19 is not the first infection in the world, but in the last two decades, there have been several new viral infections, such as SARS-CoV1, Ebola, and MERS-CoV. However, the spread rate of these viruses is not as fast as Covid-19, which ultimately makes countries over the world unprepared for the extreme changes due to Covid-19 (Djalante *et al.*, 2020; Wu and McGoogan, 2020).

President of Indonesia, Joko Widodo, announced the first confirmed Covid-19 case in Indonesia on March 2, 2020 (Siagian, 2020). The first initial case was tracked in the Special Capital Region of Jakarta (Solichin and Khairunnisa, 2020). Since its first detection back then, the Ministry of Health had to arrange strategies to prevent the spread. One of the initial steps taken was issuing a Decree of the Indonesian Ministry of Health Number HK.01.07/MENKES/2020 concerning the Covid-19 Testing Laboratory Network on March 16, 2020 as many as 12 units. The Center for Papua Health Research and Development, based on a Decree of the Indonesian Ministry of Health, is the first laboratory in Papua appointed to conduct COVID-19 testing. The laboratories, however, could not accommodate all Covid-19 testing required. On July 1, 2020, the Indonesian Ministry of Health added the number of testing laboratories as many as 163 laboratories as issued in Decree Number HK.01.07/Menkes/405/2020 concerning the Covid-19 Testing Laboratory Network.

The basic measures to tackle Covid-19 rest on the discovery of suspected/ probable cases, isolation, and laboratory tests. Patient confirmed positive in the RT-PCR result needs to receive therapy according to the protocol. Contact tracing needs to be carried out as soon as the suspect case is found. Close contacts will be quarantined and monitored for 14 days. If they do not show any symptoms, they will be released from quarantine. At the same time, those with symptoms will be immediately isolated and checked for Covid-19 using RT-PCR.

Specimens were collected from the upper respiratory tract, such as nasopharyngeal swab (NP) and/or oropharyngeal swab (OP). The RT-PCR test better needs to be taken through nasopharyngeal and oropharyngeal swabs due to the higher viral load. Sometimes, specimens are also collected from broncho alveolar lavage (BAL) for some cases.(Geri *et al.*, 2020; Vlek *et al.*, 2021)

The gold standard Covid-19 test examines a unique sequence of viral RNA using nucleic acid amplification testing (NAAT). One of the NAAT types is real-time reverse transcription-polymerase chain reaction (rRT-PCR) which is generally used to detect a genetic disease such as Tay-Sachs disease mutation, thalassemia,

Indonesian Journal of Health Administration
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p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i1.2022.219-231

monogenic disease, and even bronchitis virus infection in chicken (Traeger-Synodinos, 2006; Fellahi *et al.*, 2016; Abdelrazik, Elshafie and Abdelaziz, 2020; Corman *et al.*, 2020; Tahamtan and Ardebili, 2020). The Covid-19's genome encodes the nonstructural proteins to form the replicase-transcriptase complex, four structural proteins, and the putative accessory protein. Covid-19 testing targets four primary genes which are E (Envelope), N (nucleocapsid), S (Spike), and RdRp. Patient will be confirmed positive if a typical sequence of viral RNA is found in the specimen sample obtained from nasopharyngeal-oropharyngeal swabs (Mögling *et al.*, 2020; Zhang *et al.*, 2020). This virus infects receptors on the cell surface or ACE 2 (Angiotensin Converting Enzyme 2). It spikes to ACE 2 that is abundantly expressed in the respiratory tract, lungs, renal epithelium, immune cells, and others. The amount of positive-sense single-stranded RNA genome (29.7 kilobases) shares 79.6% sequence identity with SARS-CoV-1 (Michaud *et al.*, 2020; Wahjudi, 2020; Yusra and Pangestu, 2020; Plescia *et al.*, 2021). The closed system of RT-PCR minimizes the false-positive results of running the sample. RT-PCR has excellent sensitivity and specificity, low contamination risk, easy, and fast operation, and thus becomes an appealing alternative to conventional culture-based or immunoassay-based testing methods used in the clinical microbiology in diagnosing many infectious disease (Egbuna and Brown, 2013).

In addition to rRT-PCR, Covid-19 testing can also be done with Rapid Molecular Test (RMT). Based on its location, RMT is categorized into mobile platform and facility-based platform RMT. One of the RMTs used in Indonesia is GenXpert® or Xpert®Xpress. GenXpert is a cartridge-based nucleic acid amplification machine commonly used to test TB and MDR TB (Becker *et al.*, 2020; Oladimeji, Atiba and Adeyinka, 2020; Yusra and Pangestu, 2020).

On March 22, 2020, the first positive case of Covid-19 in Papua was reported by the Papua Covid-19 Response Acceleration Task Force. The number of confirmed cases in Papua reached 124 cases a month after the first case was reported (Sahli *et al.*, 2020). It has prompted the Papua Provincial Government to take preventive measures against a significant increase in the number of cases. The Deputy Governor of Papua gave instructions to the Papua Covid-19 Response Acceleration Task Force to accelerate laboratory testing (Pratiwi, 2020). Two laboratories that have meet the requirements to perform Covid-19 testing include the Center for Papua Health and Research Development Laboratory and the Papua District Health Laboratory. However, it is not enough to lean towards the laboratories alone to serve all districts in Papua.

As of May 26, 2020, the Center for Papua Health Research and Development successfully examined 2,400 samples and detected 436 positive samples. Further, the number increased to 11,955 as of June 24, 2020, as a result of Covid-19 testing conducted by the Papua Health Research and Development Center for the Ministry of Health and the Papua District Health Laboratory.

Papua is divided into five customary territories: Mee Pago, La Pago, Ha-Anim, Saireri, and Mamta. They share similarities in kinship, marriage, customary rights, geographical conditions, and others (Papua Regional Liaison Institution , 2020). The customary areas have commonly been determined for program implementation by the Papua Provincial Health Office. Similarities in landscapes, customs, and cultures shared and easy access to

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transportation between districts are expected to ease the execution of health programs. In this study, representatives were taken from a district in each customary territory. The five districts represent their regions with adequate hospital and laboratory conditions than other districts. Mimika General District Hospital represents areas surrounded by central geographical mountains (Mee Pago), and Jayawijaya General District Hospital has attributes similar to La Pago. Merauke General District Hospital has the geographical area of the swamp (Ha anim), and Biak General District Hospital represents a coastal geographical area (Saireri). The last area is Yowari General District Hospital in Jayapura Regency which represents Mamta.

To deal with Covid-19, accelerating the completion of Covid-19 testing is a must. For instance, the government may increase the testing capacity in each region, such as the availability of reagents, consumables, adequate facilities, and human resources. Covid-19 testing laboratories should be ready to optimize national testing needs not only for Covid-19 but also other diseases to provide the best patient care (Kaul, 2020).

This study was necessary to conduct since testing laboratories in Papua were not available at the moment in other regions with unique geographical conditions. Therefore, this study mapped the availability of thermal cycler equipment and rapid molecular tests for Covid-19 in five customary areas of Papua.

Method

This cross-sectional descriptive study was conducted in May-June 2020 by collecting primary and secondary data sources. Availability of Rapid Molecular Test data collected from Papua Provincial Health Office (HIV Program). Samples were taken with purposive sampling from a district in each customary territory that have molecular test for Covid-19. The five districts represent their regions with adequate hospital and laboratory conditions than other districts. Mimika General District Hospital represents areas surrounded by central geographical mountains (Mee Pago), and Jayawijaya General District Hospital has attributes similar to La Pago. Merauke General District Hospital has the geographical area of the swamp (Ha anim), and Biak General District Hospital represents a coastal geographical area (Saireri). The last area is Yowari General District Hospital in Jayapura Regency, which represents Mamta The primary data was collected through interviews with related laboratory officers via a cell phone and video conference such as Google Meet. The Chairperson of the Papua Covid-19 Response Acceleration Task Force represented by the Spokesperson for the Chairperson of the task force, the Chair of the Regency Papua Covid-19 Response Acceleration Task Force representing five customary areas (Ha Anim, Saireri, Mee Pago, Lapago, Mamta) was represented by the spokesperson for the task force. The section head of human resources represented the Covid-19 referral hospital. The Papua District Health Laboratory was represented by the Head of the Papua District Health Laboratory. Center for Papua Health Research and Development was represented by the head of the Center for Papua Health Research and Development. Secondary data were obtained from records released by the Papua Provincial Health Office and other related institutions. Field observations were carried out at laboratories and referral hospitals in Jayapura city to identify types of PCR available, PCR location, infrastructure, human resources, SOPs, and other aspects. For laboratories outside

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i1.2022.219-231

Jayapura city, observations were made via video conference. Descriptive data analysis described the province's readiness to face the Covid-19 pandemic and the results of RT-PCR testing. Data collection was conducted through telephone interviews and dissemination of questionnaire which consists of open questions. The main question of interview is about the laboratory. We asked about PCR brand, laboratory equipment, laboratory maintenance, laboratory safety capacity, human resources, and data management. Other devices used to collect the data were a notebook (field note) and a cell phone camera. Initially, the data would have been collected through virtual meetings, but due to limited signal providers, it was retrieved via WhatsApp and email.

Results and Discussion

Laboratory Safety Capacity

Rapid Molecular Test Equipment (GeneXpert) has been provided in several districts/cities (Table 1).

Following the Decree of the Indonesian Ministry of Health Number HK.01.07/Menkes/214/2020 concerning the Covid-19 Examination Laboratory Network, the Covid-19 testing laboratory must apply BSL-2 (Bio Safety Level 2). BSL-2 is also a safety guideline issued by the WHO for Covid-19 testing laboratories. It is also mentioned that Covid-19 testing should be done at the BSL-2 laboratory to protect laboratory personnel and the environment (Coronaviruses and New, 2013; WHO, 2020).

During the early Covid-19 pandemic in Papua province, Covid-19 testing was only available at two institutions: Center for Papua Health Research and Development and the Papua District Health Laboratory. The laboratories have fulfilled the requirements for being Covid-19 testing laboratories in Jayapura city.

Table 1. Availability of Rapid Molecular Test by Locations in Papua

No	Name of Regency	Public Health Facilities
1	Supiori	Supiori District General Hospital
2	Nabire	Nabire District General Hospital and Karang Tumaritis Primary Healthcare Center
3	Mimika	Mimika District General Hospital, Timika Primary Healthcare Center, Freeport Hospital
4	Biak	Biak District General Hospital, Biak Primary Healthcare Center
5	Yapen	Serui District General Hospital
6	Paniai	Paniai District General Hospital
7	Asmat	Asmat District General Hospital
8	Mappi	Mappi District General Hospital
9	Merauke	Merauke District General Hospital, Mopah Primary Healthcare Center
10	Jayapura	Yowari Hospital, Sentani Primary Healthcare Center & Nimboran Primary Healthcare Center
11	Jayawijaya	Wamena District General Hospital & Wamena Primary Healthcare Center
12	Keerom	Kwaingga District General Hospital
13	Boven Digoel	Boven Digoel District General Hospital
14	Jayapura City	Jayapura District General Hospital, Abepura Hospital, Marten Indey Hospital, Twano Primary Healthcare Center, Papua District Health Laboratory

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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Table 2. Covid-19 Testing Capacity at Five hospitals

Hospital	Brands	Covid-19 Testing Capacity
Mimika District General Hospital	Abbott Real Time Robotic Model M2000 System (Eight-year operation)	96 samples per day, target genes: RdRp and N.
Merauke District General Hospital	RMT GeneXpert Model GX-IV (Four-year operation)	Since June 2020, 32 samples per day, target genes: E and N
Jayawijaya District General Hospital	RMT Cepheid GeneXpert Model GX-IV (Three-year operation)	Since June 2020, 95 samples per day, target genes: N and E
Biak District General Hospital	RMT GeneXpert	Since July 2020, 9 samples per day (Monday-Wednesday-Friday for Covid-19 services, Tuesday-Thursday-Saturday for TB services)
Yowari Hospital	RMT GeneXpert Model GX-IV (One-year operation)	Has not been used for Covid-19 testing

Of the five health service providers under investigation, Biak District General Hospital and Yowari Hospital did not possess a BSL-2 laboratory. Law Number I of 1970 and Law Number 23 of 1992 concerning Occupational Safety and Health are strong legal foundations in improving health service quality. The laws were then explained further in b the Decree of the Director-General of Medical Services Number HK 006.06.3.5.00788 of 1995 concerning Hospital Accreditation including clinical laboratory services and quality of health services at hospitals. Using the decree into hospital's policy, Covid-19 testing laboratories can equip themselves with standards operating procedures that can reduce the risk of the viral exposure in laboratory officers and limit the viral spread to the work environment and community. Each hospital has to apply BSL 2 in its laboratory to obtain excellent and accurate results since they are a determinant of success in case tracing.

Testing Capacity

The Center for Papua Health and Research Development and Papua District Health Laboratory had different tools. The Center for Papua Health Research and Development used Biorad CFX-96 with a sample testing capacity of 96 samples per running approximately 4 hours for RNA extraction and 2 hours for PCR. The average testing capacity was 300-400 samples/day. The Center for Papua Health Research and Development was assisted by the National Food Drug and Agency of Jayapura to perform the PCR test using the RotorGene machine, which routinely works on 70 samples/day. Meanwhile, the Papua District Health Laboratory has real-time Abbott Automatic to run 96 samples/day, and it takes 6.5 hours to proceed the testing.

Of the hospitals studied, only Mimika District General Hospital had PCR tool (Table 2). The other four hospitals had RMTs, which are used to check the Covid-19 infection. RMTs were already in the hospital before the pandemic occurred. The Rapid Molecular Test, a molecular in vitro diagnostic tool, was priorly used for

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i1.2022.219-231

Tuberculosis screening. The Xpert Xpress SARS-CoV-2 test, performed on GeneXpert, is an automated in vitro diagnostic test for qualitatively detecting the nucleic acid from SARS-CoV-2 that uses single-use cartridges. Primers and probes become an internal control for the in vitro qualitative detection of SARS-CoV-2 RNA in the Xpert Xpress SARS-CoV-2 kit.

Each laboratory has not achieved the Covid-19 testing acceleration targeted by the Papua Deputy Governor. Hospital laboratories with RMT tools also find it challenging to perform a large number of testing as they are also allocating the testing for TB services. The limited number of tests forced the district to deliver samples of specimens collected in those two laboratories to one of the hospitals in Jayapura city for examination.

Supporting Laboratory Facilities

The Covid-19 testing must be supported by good and complete supporting tools to generate accurate results. If the tools are not compatible and cannot be simultaneously operated, the samples of specimens cannot be investigated well. The laboratories studied had been equipped with supporting tools which had been utilized for other laboratory testings, such as clinical chemistry, hematology, and immunology testing.

This study revealed Yowari Hospital in Jayapura city had not set a BSC (Bio Safety Cabinet) for its laboratory. Apart from BSC, other essential tools such as autoclave, micropipette, freezer-20, 4-degree refrigerator, vortex, centrifuge, and other tools were available at all five hospital laboratories.

Data Management

One of the essential procedures in dealing with the Covid-19 pandemic is data management (Januraga and Harjana, 2020). Real-time reporting of the testing results could be made from each regional laboratory and task force to the National Institute of Health Research and Development, thereby providing inputs for accurate decision-and-policy making. The President of the Republic of Indonesia suggested to improve the Covid 19 data management, for example, by providing one-door data access. Data management should be the common concern in accelerating the Covid-19 pandemic handling. In addition to government policies, quick testing results will serve patients with immediate responses. All positive and negative results from PCR and Molecular Rapid Tests should be submitted to the National Institute of Health Research and Development (NIHRD) as instructed in the Circular Letter of the Indonesian Ministry of Health Number HK.02.01/MENKES/234/2020. The result submission was done through a digital application, and thus health service providers having neither PCR nor Molecular Rapid Test could check the reports in real-time. Currently, the results from GeneXpert Molecular Rapid Test were still reported through the SITB (Tuberculosis Information System), while PCR results were submitted by laboratory officer through the digital application. However, Jayawijaya District General Hospital, Biak District General Hospital, and Yowari District General Hospital had not used the application to report the testing results because they did not conduct the testing independently. All records application are only used to obtain the examinations conducted by the Center for Papua Health Research and Development and Papua District Health Laboratory in Jayapura city. At the Mimika Hospital Laboratory, it met the testing standards as it provided test request forms (doctor/ hospital introduction) and reported the results. Also, an information system was available for submission and collection of

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i1.2022.219-231

Table 3. Estimated examination cost

No	Laboratory	Estimated examination cost sample (Rp)	Estimated examination cost per day (Rp)
1	Center for Papua Health Research and Development	320.000	128.000.000 (for 400 samples)
2	Mimika Regional Hospital	730.000	73.000.000 (for 100 samples)
3	Merauke Regional Hospital	770.000	25.000.000 (for 32 samples)
4	Biak Regional Hospital	770.000	7.700.000 (for 10 samples)

testing results there. Besides, the Mimika Hospital laboratory also applied a reporting mechanism at the provincial level.

Costs

The Covid-19 testing cost was also compared to one laboratory to another. The Center for Papua Health Research and Development using RT-PCR Biorad CFX-96 purchased extraction reagent for 250 reactions of Rp 38,000,000 and PCR reagent Rp 40,000,000 with an estimated cost of Rp 320,000 per sample. The reagent procurement cost was allocated from the office budget. However, if the BNPB (National Disaster Management Authority) procures the reagent extraction, the laboratory only will supply consumables and other expenses. For 400 patients/sample, the laboratory needs to spend Rp 128,000,000 of the office budget for purchasing reagent extraction.

The Mimika Hospital Laboratory, which used Realtime Abbott Automatic M2000, spent Rp 69,000,000 per 96 samples for reagent extraction. An estimated cost per sample was Rp 730,000. In other words, 100 patients/sample would cost Rp 70,000,000 for reagent extraction per day. Unlike the previous laboratory, Merauke District General Hospital Laboratory spent Rp 7,700,000 for reagents per 10 cartridges using the Molecular Rapid Test GeneXpert. The estimated cost per sample was Rp 770,000. Everyday reagent extraction for 32 patients would cost Rp 25,000,000.

This study also found the Biak Regional Hospital Laboratory, using the Molecular Rapid Test GeneXpert, spent Rp 7,700,000 per 10 cartridges with an estimated cost of Rp 770,000 per sample. The possible reagent extraction cost required for ten patients was around Rp 7,700,000. Using the same testing tool, Jayawijaya Regional Hospital Laboratory spent Rp 7,700,000 per 10 cartridges or an estimated cost of Rp 770,000 per sample. An estimated everyday cost for 95 patients required Rp 74,000,000. However, Yowari Hospital Laboratory has not estimated any budget for Covid-19 testing.

To conclude, the cost of regular RT-PCR testing is more economical than automatic RT-PCR and RMT.

Standard Operating Procedure

One of the important considerations for the Covid-19 testing is the implementation of SOPs which regulate any activities in the laboratory and become a means of creating effective working conditions and systems. Standard operating procedure (SOP) is a set of written instructions to perform or complete a laboratory process safely and effectively. SOP helps laboratory officers examine the samples. They can carry out the procedure

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i1.2022.219-231

correctly every time and reduce the possibility of errors result or steps. SOP should be written by an expert and easy to read. SOPs available at five hospital laboratories regulate waste handling, decontamination, and the use of tools.

Laboratory Equipment Maintenance

The Covid-19 testing requires good laboratory equipment maintenance. Maintenance is all activities to maintain facilities and equipment for proper and well-operated system which should always be in ready-to-use condition. Laboratory equipment with a high frequency use may have a higher probability of contamination. Therefore, laboratory officers should make sure to daily disinfect the tools.

In Mimika District General Hospital, the RT-PCR had a periodic maintenance schedule and was calibrated annually by PT. Abbott Molecular. The tool was commonly used for HIV viral load testing prior to Covid-19 testing. Regarding the BSC, the hospital also conducted periodic maintenance schedule and hired annual calibration services of PT. Biobase.

The GeneXpert Molecular Rapid Test at Merauke General District Hospital was calibrated every year. It was usually utilized for Tuberculosis testing before Covid-19 testing was required. PT. Basao Prima Sentosa was in place to check the BSC function both at Merauke and Biak District General Hospital. In Jayawijaya District General Hospital, the GeneXpert Rapid Molecular Test was calibrated annually by PT Mitra Tera, while for BSC maintenance, the hospital partnered with PT Arneta. However, Yowari Hospital was not appointed for the Covid-19 testing during the research. Most of the hospital laboratories, in summary, already had a periodic maintenance schedule and a calibration schedule every year for the equipment which was previously used for other laboratory testing such as hematology, immunology, and clinical chemistry examinations.

Human Resources

The Covid-19 laboratory testing must have trained human resources. Laboratory officers who were involved in the Covid-19 screening process dealt with active pathogens, and thus they had to have laboratory expertise. Trained human resources can conduct the extraction process and PCR test appropriately since they have been taught about laboratory practice standards and skills in the relevant technical and safety procedures. With the expertise, they have greater possibility to avoid the viral contamination.

A specific number of human resources are required in tool maintenance and sample testing. At the Center for Papua Health Research and Development designated 10 officers consisting of 4 officers in the extraction section and 6 officers in the RT-PCR section.

This study pointed out Mimika District General Hospital had three officers of whom two officers trained for the use of PCR. While, two officers were responsible for Covid-19 laboratory testing using RMT at Merauke District General Hospital. At Biak District General Hospital, six officers had been trained to use RMT. Meanwhile, three untrained officers were assigned to conduct RMT in Jayapura Regency, Yowari Hospital.

The Mimika District General Hospital has conducted training and mentoring with PT Abbott Molecular technicians. Before assigning the task to the officers, Merauke District General Hospital also partnered with Papua District Health Laboratory to train the officers about the use of RMT. The Jayawijaya District General Hospital, Biak District General Hospital, Yowari Hospital still required further assistance and training about the use of RMT from the Papua District Health Laboratory.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i1.2022.219-231

Use of Laboratory Facilities during Pandemic

During the pandemic, the laboratory facilities described were not only used for Covid-19 testing. However, the laboratories also utilized the tools for other disease examinations such as Tuberculosis, HIV, genetic diseases, and others.

Conclusion

The Covid-19 molecular based testing capacity of laboratories from various regencies representing five customary areas of Papua has not yet reached its maximum capacity yet in the beginning of pandemic. Districts that only had the GeneXpert tool were recommended to procure RT-PCR, and thus the tool could accelerate the Covid-19 testing in Papua province. If RT-PCR is available in several cities/districts within one customary area, samples can be delivered more quickly. Papua province could carry out 1,000 RT-PCR tests/day which could target 30,000 samples/day as instructed. Districts in the customary area of Mamta (Jayapura district) are advised to have a Biosafety Cabinet (BSC) for safe and proper laboratory examination. The cost of RT-PCR testing is more economical than automatic RT-PCR and RMTs. However, some obstacles might be found in the use of regular RT-PCR. For example, it requires highly trained human resources to carry out the extraction process, mix PCR reagents, and analyze the machine's data.

Abbreviation

Covid-19: Corona Virus Disease-19; SARS-CoV2: Severe Acute Respiratory Syndrome Coronavirus-2; RT-PCR: Real Time-Polymerase Chain Reaction; RMT: Rapid Molecular Test; BNPB: *Badan Nasional Penanggulangan Bencana*; SOP: Standard operating procedure.

Declarations

Ethics Approval and Consent Participant

Respondents were addressed before the survey about the survey's objectives and purposes.

Conflict of Interest

The authors declared no conflict of interests

Availability of Data and Materials

Data and material research can be provided at open data repository (OSF, Zenodo, Repositori Ilmiah Nasional, Institutional Repository Data and etc.) or by upon request.

Authors' Contribution

MW and CI conceptualized the study; MI created the methodology; CI wrote, and edited the manuscript; CI wrote the original draft; MW reviewed the manuscript.

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Original Research

Indonesian Journal of Health Administration
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THE ADVOCACY AND COMMUNICATION OF SMOKE-FREE AREA REGULATION IN EAST JAVA, INDONESIA

Advokasi dan Komunikasi Peraturan Daerah Kawasan Tanpa Rokok di Jawa Timur, Indonesia

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Abstract

Background: The negative impact of tobacco, especially second-hand smokers, requires imperative actions. Introducing tobacco control measures helps protect the public health. Data suggest that there were approximately 44 million daily smokers in Indonesia comprising 49.8 million males and 3.9 million females over ten years of age. East Java Province had the biggest number of smokers in Indonesia. To reduce trends in smoking behavior, we need to advocate local government to release and implement smoke-free regulations.
Aims: The study aims to do action research through advocacy and communication for the regulation of smoke-free areas in East Java Province.
Methods: The action research involved 12 districts of East Java Province, Indonesia. The method used in this study was Focus Group Discussion (FGD), one-on-one meeting, in-depth interviews, public speaking, press conference, and press release.
Results: Intensive advocacy and communication worked successfully. Eight districts of East Java Province implemented local regulations of smoke-free areas. The advocacy and communication of the regulations made it possible to be implemented.
Conclusion: Intensive advocacy and communication improve the awareness of executive and legislative government about the importance of smoke-free area regulations. It will be successful if regular meetings, discussions, press conferences, public speaking, and team work are conducted with many stakeholders.

Keywords: advocacy, communication, tobacco control, East Java Province.

Abstrak

Latar Belakang: *Dampak negatif dari tembakau, terutama pada perokok pasif, perlu ditindaklanjuti. Mengenalkan upaya pengendalian tembakau membantu melindungi kesehatan masyarakat. Data menunjukkan sekitar 44 juta perokok dalam setiap harinya di Indonesia yang terdiri atas 49.8 juta perokok laki-laki dan 3.9 juta perokok perempuan berusia 10 tahun. Provinsi Jawa Timur merupakan provinsi dengan prevalensi perokok terbesar di Indonesia. Untuk mengurangi maraknya perilaku merokok, kita perlu mengadvokasi pemerintah daerah untuk menerbitkan dan memberlakukan Peraturan Daerah tentang Kawasan Tanpa Rokok.*
Tujuan: *Penelitian ini bertujuan untuk melakukan action reseacrh melalui advokasi dan komunikasi peraturan Kawasan Tanpa Rokok di Provinsi Jawa Timur.*
Metode: *Penelitian ini melibatkan 12 kabupaten/kota di Provinsi Jawa Timur Indonesia. Metode yang digunakan adalah Focus Group Discussion (FGD), one-on-one meeting, wawancara mendalam, public speaking, konferensi pers, dan pers rilis.*
Hasil: *Advokasi dan komunikasi yang intensif telah membuahkan hasil nyata. Delapan kabupaten/ kota di Jawa Timur menerapkan peraturan area bebas rokok. Advokasi dan komunikasi memungkinkan untuk diterapkannya regulasi tersebut di Jawa Timur.*
Kesimpulan: *Advokasi dan komunikasi yang intensif meningkatkan kesadaran pemerintah dan DPRD akan pentingnya regulasi kawasan tanpa rokok. Langkah ini akan berhasil jika dilakukan pertemuan rutin, diskusi, public speaking, konferensi pers, dan bekerja sama dengan berbagai pihak.*

Kata kunci*: advokasi, komunikasi, pengendalian rokok, Jawa Timur*

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Introduction

Recent evidence suggests that annually, over eight million deaths can be attributed to tobacco use. Seven millions of those were directly linked to tobacco use, and an additional 1.2 millions occurred due to an exposure to second-hand smoke (WHO, 2020). Tobacco smoking may contributes to deaths among about 1.3 billion smokers worldwide (WHO, 2019). Tobacco smoke contain more than 7000 toxicants and up to 70 carcinogens which are damaging to the human body (Tobacco Atlas, 2022). Smoking tobacco increases the risks of multiple cancers, stroke, and respiratory diseases (Tobacco Atlas, 2022). Nicotine, for example, contains tobacco addiction, a major cause of disability and premature death (Benowitz, 2009). The health consequences of tobacco smoking are far-reaching, and people exposed to second-hand smoke also may be at risk of various serious cardiovascular and respiratory problems (WHO, 2020). Given the negative health consequences associated with tobacco, especially second-hand smoke, it is imperative to introduce tobacco control measures to help protect public health and well-being (Tobacco Atlas, 2022).

Tobacco smoke causes approximately 225,720 deaths in Indonesia annually (Tobacco Atlas, 2022). Hence, tobacco smoking is a prevalent health risk behavior. Recently published data suggests that there were approximately 54 million daily smokers in Indonesia in 2015 comprising 49.8 million males and 3.9 million females aged over ten years (Tobacco Atlas, 2022). Further, overall smoking incidence and cigarette consumption have remained relatively stable over the past thirty years (Kemenkes, 2013). Of particular concern is the rising number of young smokers in Indonesia. A recent report shows an increase in the number of youth smokers (10-18 years old) from 7.2 % in 2013 to 9.1% in 2018 (Kemenkes, 2013, 2018). Despite the prevalence of smoking within the Indonesian population, Indonesia is not a signatory to the World Health Organization's (WHO) Framework Convention on Tobacco Control (FCTC). The convention regulates a global treaty to protect present and future generations from the health impacts of tobacco use that has been agreed by 168 countries (WHO, 2005**;** Sugiyo and Henshall, 2020). The FCTC is a key achievement to facilitate a drop in both smoking prevalence and exposure to secondhand smoke (Peruga *et al.*, 2021).

To reduce the negative impacts of tobacco use on health and well-being of the Indonesian population, the Indonesian Government issued National Law Number 36/2009 and Government Regulation 109/2012. The regulations mandate strategies to promote tobacco control in Indonesia. One of the strategies is providing pictures on cigarette advertisements and packages to visualize the negative health consequences of tobacco; another one is formulating and implementing tobacco regulations together with districts in order to be suitable to the local seven smoke-free contexts i.e., health facilities, education institutions, places of worship, workplaces, child play areas, public transport, and public places. Within these seven settings, tobacco product sale, advertisement, and consumption are prohibited. This national government regulatory measure is aimed to fight against the tobacco industry such as tobacco companies and lobby groups.

Although regulations have been placed, tobacco companies pay advertisements, give scholarships, and hold sport competitions for their social responsibilities to what they have

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.232-240

produced. With this complex issue, the Indonesian legislative and executive government perceived banning tobacco products from the spaces may lead to the collapse of the tobacco industry. This may cause another problem such as employment and dead opportunities for children in school and sports.

All provinces of Indonesia are encouraged to enact smoke-free regulations. However, East Java Province was identified as a priority for regulation due to being the largest province with 38 districts which total population was 40.67 million people (Kemenkes, 2018). Tobacco was identified as the second highest risk factor for death and disability after high blood pressure in the province (Vos *et al.*, 2020). East Java provincial data reveals that of the eleven most common diseases in the province, seven diseases i.e., stroke, ischemic heart disease, cirrhosis of the liver, chronic obstructive pulmonary disease, lower respiratory infection, hypertensive heart disease, lung cancer are related to tobacco consumption (Dinkesjatim, 2020).

East Java only has one city with regulations of smoke-free areas. Therefore, we conducted action research to establish the regulations in every city/ district in all regions of East Java. Smoke-free regulation is important to actualize as public health measures against the danger of smoking (Sugiyo and Henshall, 2020). During the action research, we advocated and communicated with the local government and local parliament (legislative) to agree and support the implementation of the regulations. This study used action research to perform advocacy and communication about the regulation of smoke-free areas in East Java Province.

Method

The current action research was conducted in collaboration with The Tobacco Control Support Centre (TCSC). TCSC was formed in 2008 under the directive of the Indonesian Public Health Association. The organization was established to reduce tobacco consumption to improve population health. The action research started in 2008 – 2021 was designed in line with the central government's aim to reduce smoking behavior.

For this project, we implemented advocacy communication process and activities about local regulations of smoke-free areas within 12 districts of East Java Province i.e., Surabaya City, Blitar District, Ngawi District, Mojokerto District, Madiun City, Madiun District, Lumajang District, Ponorogo District, Bojonegoro District, Pacitan District, Jember District, and Batu Districts. For the research method, we used one-on-one meetings where had in-depth interviews and discussions with the major/head of the cities/districts, local health districts office, and the legislative government. Then, we conducted a focus group discussion (FGD) among local health districtsofficers, law departments, non-governmental organizations, mass media, and community organizations. Besides, we made a press conference and press releases on local and national mass media to reach more audience. After that, we conducted public speaking sessions to disseminate the regulations and encourage people to obey them. The data were analyzed by monitoring and evaluating the processes and the results of the action research. As the indicator of success, we counted how many cities or districts had the regulations after they participated in our advocacy and the communication sessions. As a final thought, we used the

Indonesian Journal of Health Administration
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evaluation of the action research as basic standards for smoke-free advocacy in East Java Province.

Result and Discussion

The TCSC members started the action research by contacting the district health offices in Surabaya City, Blitar District, Ngawi District, Mojokerto District, Madiun City, Madiun District, Lamongan District, Ponorogo District, Bojonegoro District, Pacitan District, Jember District, and Batu Districts. We conducted in-depth interviews and discussion about the urgency of smoke-free regulations. Data on smokers in every city and the risk behavior factor were collected from TCSC. We did in-depth interviews, one on one meetings, and focus group discussion to identify the problems. From the methods, on average, most of the informants mentioned it was very difficult to implement smoke-free regulations due to increasing numbers of smokers in their city and tobacco farming. Some of the cities were the biggest tobacco industry in Indonesia. However, from the discussion about the tobacco impact on health, economic, and social aspects, the informants were mostly aware and agree with us to have local smoke-free regulations.

After meeting with the local stakeholders, we moved the process to creating local smoke-free regulations for the cities. Some activities of advocacy and communication were done by working with the law departments to make a draft of smoke-free regulations. We initiated a discussion about smoke-free regulation and drafted academic scripts with district health offices and the law departments before proceeding the draft to the parliament.

We found that the biggest challenge was to share perceptions with the legislative government/parliament. In the process, we conducted meetings with the parliament (legislative) in every city for several times over a year. We also conducted focus group discussions (FGDs) with the parliamentary councils to understand their perceptions about the impacts of tobacco use and smoke-free regulation. FGDs could generate a deliberate decision as it offered a participatory format for group members to build their collective understanding of issues and solutions such as tobacco control. We also encouraged informants to discuss the negative impacts of tobacco use. This, thereby, could shape a collective understanding of the urgency for action. The other activity we performed was one-to-one meetings with parliamentarians to advocate policy formation on smoke-free areas.

On average, after more than a year of sustained advocacy and communication, the executive council and parliament responded by prioritizing tobacco issues to be addressed immediately. As urging local smoke-free regulations, we gathered Non-Governmental Organizations (NGOs) (e.g. Children Protection Organization, Indonesian Women without Tobacco, and Consumer Protection Institution) to lead demonstrations during the meeting. During the demonstrations, the NGOs held banners and posters and distributed flyers to the attendees. Such actions demonstrate the potential of both advocacy and networking for positive social change whilst also highlighting the importance of working with multi-disciplinary stakeholders such as parliament, executive council, law departments, provincial law bureaus, NGOs, and the mass media. To further demand the parliament on the smoke-free regulation, we showed a baby doll with cigarettes on its head to symbolize the real impact of cigarettes on children.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.232-240

Moreover, we conducted a press conference to publish the agenda. Advocacy and communication by mass media was also effectively to accelerate the release of the regulation. More than twenty media were invited to come and make some publications about the regulation. Press releases were then distributed to reach other mass media which did not come in the press conference.

Passing smoke-free regulation was a challenging agenda for the parliamentarians, who had to consider both sides of positions. For example, tobacco use may lead to negative public health impacts. On the other, the potentially detrimental economic impact could be related to tobacco tax as one of the largest contributors to the Indonesian economy. This is particularly significant for Surabaya, where three of the largest tobacco factories in Indonesia operate. Parliamentarians were concerned about the decreasing government revenue.

Intensive advocacy and communication came to work effectively. Eight of 12 cities agreed to release the local regulations. Further, the Surabaya city's regulations warranted some revisions as only five of seven smoke-free areas were mentioned in the regulations. Following 15 months of deliberation regulation for smoke-free settings was passed in Surabaya City, and implemented one year later in October 2009 (titled: Local Regulation No.5 2008) The regulation only covered five types of areas: health facilities, education institutions, places of worship, child play areas, and public transport. This regulation was applied not only for traditional tobacco but also e-cigarettes which also contain nicotine. Toxicants, ultrafine particles, and carcinogens are also found in an e-cigarette, and they may cause adverse health effects (Walley *et al.*, 2019). A study in the Netherlands shows that participants were unhappy about tobacco because of control experienced as a moral failure and as neglect of financial responsibilities (Thirlway, 2019).

Tobacco consumption in workplaces and public places was prohibited. No-smoking signage was implemented across all seven settings of the cities. However, indoor places were equipped with designated smoking rooms. Further, as the regulation No. 5 of 2008 was implemented before the release of National Governmental Law No. 36 of 2009 and 102 of 2012, it did not comply with the National Laws, especially on smoke-free areas

To align Surabaya city's regulations on smoke-free areas, the TCSC initiated a revision to local regulation No.5 of 2008. They evaluated the implementation of tobacco regulations in the seven areas with the East Java Provincial Health Office in April 2012. The TCSC conducted on-the-ground research on over 1,000 premises or locations in Surabaya. The results indicate that very few (1%) smoke-free settings adhered to the Government Law. The TCSC mentioned that increasing awareness of the smoke-free law in public places (e.g., schools and health facilities) as well as through mass media. However, few media bring the issue of smoke-free regulations. This issues receives less attention presumably because of strong smoking culture that pervaded among reporters. To foster the media's support, the TCSC reiterated the purpose of the law, which was not to forbid smoking, but rather regulate permissible smoking areas. The regulation is important for protecting women and children who can be affected by secondhand smoke. Besides, smoking can cause cigarette butt pollution and tobacco denormalization (Henderson *et al.*, 2021).

In the next step, the TCSC provided journalists with training on how to write an

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.232-240

article about tobacco control and local regulations of smoke-free areas. Following the training, almost all mass media outlets published news articles regarding the urgency of smoke-free regulation and the support for the regulation revision and implementation. After this step, the TCSC conducted another evaluation on the implementation of tobacco regulations in seven settings. The results show that 30% of the locations complied with the regulations. The TCSC also encouraged the Surabaya's Government and Parliament to revise the local smoke-free regulations.

To convince the Government to take actions on the new regulations, the TCSC took the parliamentarians to visit Bali where first-hand smoke-free regulations were robustly implemented in seven settings. Meetings were conducted with the Bali Provincial Executive Council and Parliament. From the visitation, the Parliament learned how to draft and implement local smoke-free regulations and benefits of the regulations for health and wellbeing of the Balinese community. The Surabaya City Government consequently released the revised local smoke-free regulations on April 22, 2019 (Regulation No. 2, 2019). With the revision, the Government had aligned the regulation with the National Law of 2009 and Government Regulation of 2012.

Besides revising the Local Regulation No. 5 of 2008, the TCSC advocated Surabaya and other 11 districts of East Java Province to formulate smoke-free regulations in January 2014 - 2019. The agenda in the advocacy program were sensitizing local government and parliamentarians, speaking the issues on various media platforms (e.g., television and radio), holding press conferences on printed media and e-media, and raising awareness of the local communities about smoke-free public spaces (e.g. schools, restaurants, hospitals). On-air press release and findings from community surveys made the advocacy more effective. The findings of the community surveys demonstrate the public's support for implementing local regulations of smoke-free areas and holding further advocacy. We decided to publish papers and brochures on the harmful effects of tobacco to strengthen the advocacy. Besides that, we helped drafting laws to ban cigarette advertisement and sponsorship, as well as raise taxes on cigarettes to reduce purchasing affordability, particularly of youth.

Such advocacy by the TCSC and local NGOs could improve community awareness of the community and support for the smoke-free initiative. The TCSC collaborated with the East Java Provincial Health Office and NGOs (e.g., Children Protection Institution and Women without Tobacco). The TCSC partnered with the National Commission for Tobacco Control in 2018 to form a tobacco victim organization (AMKRI) in East Java. The TCSC delivered capacity-building workshops for 12 district health offices, one local law bureau, and 12 local city planners in East Java to build support for local regulations of smoke-free areas. The TCSC also advocated each district law department and provincial law bureau to support the local regulations of smoke-free areas. We found that almost all of the law departments supported the local regulations of smoke-free areas.

We successfully performed intensive advocacy and communication in East Java Province. Eight districts of East Java had implemented local regulations of smoke-free areas (Surabaya City, Blitar District, Ngawi District, Mojokerto District, Madiun City, Madiun District, Lumajang District, and Batu City) (Table 1).

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.232-240

Successful advocacy and communication in our research demonstrate the potential of positive social change whilst also highlighting collaborations with multi-disciplinary stakeholders such as parliament, executive council, law departments, provincial law bureaus, NGOs, and mass media. Some cities i.e., Pacitan, Ponorogo, Bojonegoro, and Jombang were on going to release their regulations at different levels of governance (Table 1).

The cities currently tried hard to implement their regulations in the community by collaborating with various partners such as health school officers, non-government organizations, and local communities. They bravely reinforced the regulation implementation by training the officers and educating people. Advocacy efforts are one of the ways to reducing the trends in smoking behavior.

Smoke-free regulation will effectively protect the population, which is at a higher risk of exposure. Implementing the regulation in the seven settings is an reinforcement of tobacco control (Cham *et al.*, 2021).

After the smoke-free regulation establishes, it is recommended to follow up with law enforcement. A study in Hongkong shows that smoke-free regulations could be comprehensively implemented in all indoor workplaces (Wang *et al.*, 2017).

Conclusion

The conclusion of the research is that intensive advocacy and communication raised the awareness of the executive and legislative government to fortify smoke-free area regulations. Multi-disciplinary collaboration will enhance the success to implement the regulations. Good networking with non-governmental organizations, health schools, and local communities is the main key to the success of advocacy.

Abbreviations

FGD: Focus Group discussion, KTR: *Kawasan Tanpa Rokok,* WHO: World Health Organization, Riskesdas: *Riset Kesehatan Dasar,* Kemenkes: *Kementerian Kesehatan,* TCSC: Tobacco Control Support Center, IHME: Institute for Health Metrics and Evaluation, FCTC: Framework Convention on Tobacco Control.

Table 1. Status of smoke-free regulations in 12 districts of East Java Province

No.	City/District	Status of Smoke-free Areas Regulation
1	Surabaya City	Surabaya City's Regulation No. 2 of 2019
2	Blitar District	Surabaya City's Regulation No. 1 of 2019
3	Ngawi District	Ngawi Regent's Regulation No. 14 of 2019
4	Mojokerto District	Local Regulation No. 3 of 2020
5	Madiun City	Local Regulation No. 5 of 2018
6	Madiun District	Local Regulation No. 10 of 2020
7	Lumajang District	Local Regulation No. 5 of 2019
8	Batu City	Local Regulation No. 10 of 2020
9	Ponorogo District	Not released
10	Bojonegoro District	Not released
11	Pacitan District	Not released
12	Jember District	Not released

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.232-240

Declaration

Ethics Approval and Consent Participant

The researchers had informed informants about the research objectives and purposes. Verbal consent to participate in the study was obtained from the informants.

Conflict of Interests

The research was partly undertaken by several of the authors on behalf of the East Java Tobacco Control Support Centre. The paper was prepared independently by the authors to document and share the work.

Availability of Data and Materials

The availability of data and materials is upon request by the journal and readers.

Authors' Contribution

SW and SM conceptualized the study. SW wrote the original draft. KD and HM created the methodology. In addition, NH and NW wrote and edited the manuscript.

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Original Research

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THE ROLE OF HEALTH WORKERS AND SUPPORT SYSTEM COUNSELORS FOR WOMEN WITH PRIMARY INFERTILITY

Peran Tenaga Kesehatan dan Konselor Support System Wanita Infertilitas Primer

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Abstract

Background: Primary infertility is a problem, one of which is psychological in infertile women. Based on the Indonesian In Vitro Fertilization Association (Perfitri), the total cycle of IVF programs in Indonesia in 2021 reached 10,000, the most significant number in handling fertility problems. Problems appear because there are no psychological services.
Aims: To explore the role of health workers and counselors in the support system at the central hospital in Semarang for women with primary infertility
Methods: This is descriptive research with qualitative exploratory design at the Central Hospital in Semarang City with five health workers and two counselors. The researcher used semi-structured, one-on-one interviews for one week. The data was then analyzed using inductive thematic analysis
Results: The results found that the support system for women with primary infertility, from the opinion of health workers, will focus on clinical care and counseling according to the diagnosis from the counselors that women with primary infertility need psychological support to assist the success of clinical care
Conclusion: Health workers and counselors need an integrated support system service for women with primary infertility.

Keywords: counselors, health workers, primary infertility, support system

Abstrak

Latar Belakang: *Infertilitas primer merupakan suatu masalah. Salah satunya adalah masalah psikis pada wanita infertil. Berdasarkan data Perhimpunan Fertilisasi In Vitro Indonesia (Perfitri) total siklus program bayi tabung Indonesia tahun 2021 mencapai 10.000 program, angka cukup besar dalam penanganan masalah fertilitas. Permasalahan muncul karena belum ada layanan psikologis bagi pasangan infertil secara khusus.*
Tujuan:*menyelidiki peran tenaga kesehatan dan konselor dalam bagian support system di rumah sakit pusat di Semarang bagi wanita infertilitas primer*
Metode: *desain eksplorasi kualitatif di RS Pusat di Kota Semarang dengan 5 tenaga kesehatan dan 2 konselor. Wawancara semi-terstruktur, dilakukan satu lawan satu selama satu minggu. Analisis data dengan analisis tematik induktif.*
Hasil: *Hasil penelitian menunjukkan bahwa support system bagi wanita infertilitas primer dari tenaga kesehatan berfokus dalam perawatan secara klinis dan pemberian konseling sesuai dengan diagnosa, dan wanita infertilitas primer membutuhkan support secara psikologis ddari konselor alam pendampingan keberhasilan perawatan klinis*
Kesimpulan: *perlu adanya layanan support system yang terintegrasi dari tenaga kesehatan dan konselor bagi wanita infertilitas primer.*

Kata kunci: *infertilitas primer, konselor, support system, tenaga kesehatan*

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Introduction

The research studies have found that women with primary infertility need support in dealing with primary infertility, one of which is support from health workers and counselors who understand the problems of primary infertility. Women feel the most impact and social pressure in this infertility problem (Novrika, Susanti and Putri, 2019). Women face primary infertility because they have not had children during their marriage. According to World Health Organization (WHO) data, about 50-80 million couples, or one in seven couples, experience fertility problems (BKKBN, 2020). In Indonesia, every year, 2 million couples experience fertility problems, and it is estimated that more than 20% of married couples suffer from infertility (BKKBN, 2020). Based on data from the Indonesian In Vitro Fertilization Association (Perfitri), the total cycle of IVF programs in Indonesia in 2021 reached 10,000. This figure is quite prominent in handling fertility problems (Persatuan Rumah Sakit Seluruh Indonesia, 2021). Data from the Central Java BKKBN shows that the number of couples of childbearing age in Central Java is 6 million, with 5.5 percent facing fertility problems. (BKKBN, 2013). Fertility problems affect 66 percent of women of childbearing age in Semarang City, Central Java, and according to data in 2020, mothers with a history of experiencing primary infertility after >1 year of marriage were 227 cases, and from 2021, to October 2021 there were 100 cases (Dinas Kesehatan Kota Semarang, 2022). Semarang has handled many infertility problems with the Central General Hospital being a referral hospital in the city of Semarang where there is a special fertility unit for clinical fertility treatment for patients with infertility. According to data in 2021 there are 445 women who experience primary infertility at the Central General Hospital in Semarang (Rumah Sakit Dr.Kariadi, 2021).

Primary infertility is a frequently found disease. As a result, reproductive health problems and psychological impacts are very clearly felt, especially on the part of women in women who have tried to have sexual intercourse with a regular frequency of 2-3 times per week and without using any contraception and the age of marriage is more than 12 months (Rosyida, 2021). Therefore, the role of health workers and counselors in providing support is essential. Still, qualitatively the form of support provided by health workers and counselors has not been seen as honest and apparent in psychological decline (Shaiju, 2020). In addition, the cost and long duration of fertility treatment make women with primary infertility psychologically feel more anxious, and the large number of expenses that must be incurred in fertility treatment is a problem that must be faced (Manikkam and Bhargavi, 2020).

This research aims to explore health workers and counselors in health services providing what services have been provided to women with primary infertility.

Method

This study used a qualitative exploratory design at the Central General Hospital in Semarang City on five health workers and two counselors. This study shares descriptions of five health workers and two counselors. We conducted semi-structured interviews. This method explored research studies about an infertile women's support system. Each interview was conducted one-on-one for one week. Data analysis used inductive thematic

Indonesian Journal of Health Administration
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10.20473/jaki.v10i2.2022.241-250

Table 1 Interview Topics and Main Questions

Theme	Question
Understanding primary infertility	Explain your opinion about primary infertility
Services for primary infertility	Explain what services have been provided to patients or women with primary infertility
Counseling	Explain whether counseling for women with primary infertility is needed, and if needed it.
Counselor	What do you think a counselor for women with primary infertility is needed
Counseling materials	Do you think the counseling materials for women with primary infertility
Media and facilities	What media are suitable for women with primary infertility, and what tools are needed when providing counseling for women with primary infertility
Method	What counseling methods are suitable for women with primary infertility
Counseling flow	Explain in your opinion how the flow of counseling can be applied in health services for women with primary infertility

analysis. Interviews were conducted regarding the understanding of women with primary infertility, what forms of services have been provided to women with primary infertility, whether there is any counseling for women with primary infertility, whether there are any obstacles in providing counseling to women with primary infertility, are there special counselors for women with primary infertility, opinions? About whether it is essential to have counselors for women with primary infertility.

This research has received approval from the central hospital in Semarang City to collect initial data regarding what support system has been given to women with primary infertility.

The interview can reveal the depth of experience. Inclusion criteria are the inclusion of participants, health workers in the gynecology polyclinic, and counselors in the hospital; standards exclude health workers and counselors who do not agree to follow this research. Participants were recruited based on the approval of the hospital. We used an interview guide, and "DP" conducted interviews by recording using a tape-recorded. The interview conducted was semi-structured interviews. Each session took approximately 30 minutes of the one-on-one interview for a week at the gynecology polyclinic of the Central General Hospital in Semarang. All interviews were written and transcribed verbatim by the interviewer.

Field notes and interview transcripts "SW" are analyzed using thematic analysis for their flexibility and potential to yield unexpected insights (Clarke and Braun, 2013). The investigation follows thematic analytic procedures: becoming familiar with the data involving transcription and reflective reading, generating initial codes, searching for themes, reviewing and refining themes, identifying coherent patterns, defining and naming themes, and developing reports (Sites, 2020). In addition, several themes emerged from interview analysis, some from interviews and notes. The peer-review

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Table 1. Characteristic of Participants

No	Health Workers/Counselors	Age (year)	Education
1	Health Workers	34	D4 Midwife
2	Health Workers	39	D4 Midwife
3	Health Workers	27	D4 Midwife
4	Health Workers	26	D3 Nurse
5	Health Workers	25	S1 Nurse
6	Counselor	54	Psychology S1
7	Counselor	40	Psychology S1

process is a validation strategy to control author bias in interpreting themes (Himelstein *et al.*, 2012). A researcher and co-researcher (DP and MZ) for the study received full transcripts of all interviews and notes and reviewed codes and themes entirely regardless of the principal investigator's participation. This peer reviewer reviews each code against each unit of meaning and quotation from the transcript. After, the principal investigator and neutral colleagues met to compare and contrast the code themes and described the result.

Result and Discussion

Five health workers and two counselors agreed to follow this study from the answer agreement. After the thematic analysis of the data, the respondent's expressions of the results of what has been given in primary infertility women's services can be identified. This includes initiation for improving the quality of life related to infertility, raising awareness, regaining control of life, and increasing acceptance, especially for women with primary infertility, as well as health care support for women with primary infertility.

Definition primary infertility

The results of interviews with five health workers regarding the understanding of primary infertility are:

> "In my opinion, primary infertility is a reproductive health problem caused by not being able to conceive during a marriage of more than 12 months, and in having sexual intercourse without using certain contraceptives and regular sexual intercourse, the condition of primary infertility is more felt in women who have to have sexual intercourse. Fertility treatment until fertilization occurs". (P1, R1-R5).

The results of interviews with two counselors regarding the understanding of primary infertility:

> "In my opinion, primary infertility is a couple who has not been able to get pregnant for more than one year of marriage, with a regular frequency of sexual intercourse 2-3 times per week, and in sexual intercourse, they have never used birth control devices. The spotlight is because they have not been able to get pregnant. Usually, women experience more psychological decline than their husbands." (P1, R6-R7).

Based on the answers to the explanations provided by adequate knowledge of primary infertility.

Services for primary infertility

The results of interviews with five health workers about services for primary infertility:

> "In my opinion, so far, primary infertility is usually carried out with clinical care according to the results of the diagnosis so that each patient with primary infertility is usually offered a form of service under the diagnosis and the provision of therapy as well so

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.241-250

that by providing clinical services, explanations and suggestions are given as long as they do the treatment. Fertility treatment, because patients with primary infertility need clinical care and treatment". (P2, R1-R5)

The results of interviews with two counselors about services for primary infertility:

"In my opinion, services for primary infertility patients, especially for women, apart from being given drugs, therapy, and fertility treatments which experts usually do, also need to be provided, such as how to deal psychologically later during fertility treatment and the process, because it is better if the psychology needs to be clarified. And open his heart in accepting the results later". (P2, R6-R7).

Based on the participants' answers, according to health workers, infertile women needed more clinical services, but according to the counselors, in addition to clinical services, infertile women also needed psychological support and assistance in dealing with infertility.

Counseling

The results of interviews with five health workers about counseling for primary infertility:

"In my opinion, it is important to give specific counseling to women with primary infertility, but again patients with this condition still require more optimal clinical treatment. Referrals can be made if the patient wants a counselor who has failed miserably. In fertility treatment such as because of permanent reproductive disease, age at risk and not possible to get pregnant again". (P3, R1-R5).

The results of interviews with two counselors about counseling for primary infertility are:

"In my opinion, specific counseling services are needed for primary infertile women without having to be referred because of serious medical problems. Again they also need psychological support. Apart from being clinical, the hope is that the patient's psyche or mind will remain good. The patient is happy, and it seems very simple to be happy because sometimes that feeling is difficult to arise when there is a problem". (P3, R6-R7).

Based on the participants that health workers think that counseling is still provided, but the main thing is clinical services, while the counselors believe that the provision of counseling is to support primary infertile women psychologically.

Counselor

The results of interviews with five health workers about the need for counselors for primary infertility are that:

"In my opinion, it is necessary to focus on counselors for infertile patients as well, but here the counselor will only accept referrals and the patient's willingness to be given a counselor, so it depends on the patient whether he wants or not or needs to be referred or not because so far this rarely happens. " (P4, R1-R5).

The results of interviews with two counselors about the need for counselors for primary infertility that:

"In my opinion, there is a need for a counselor for female psychics or patients with infertility, but here we only accept if there is a referral from the doctor or if the patient wants it, so the rest of us as counselors only provide counseling for children for school needs or related to children's psychological support needs, if the link is scarce." (P4, R6-R7).

According to health workers, counseling is only needed if primary infertile women want it, but according to counselors, it provides

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psychological services for infertile women if they get a referral from a fertility doctor.

Counseling materials

The results of interviews with five health workers about whether there are appropriate counseling materials for women with primary infertility are that:

> "In my opinion, if additional counseling should be given, the appropriate material should not only be given to the patient. Usually, people around you need to be given an explanation, for example, regarding the meaning of primary infertility, understanding sentences related to fertility treatment, unfamiliar words, and the necessary needs such as the relationship between nutrition, lifestyle, knowing the fertile period, appropriate management, the impact during fertility treatment, it seems that these links need to be understood. " (P5, R1-R5)

The results of interviews with two counselors about whether there are appropriate counseling materials for women with primary infertility are that:

> "In my opinion, the material is suitable for the psychological needs of infertile patients, moral support, material, facilities, family, and social in dealing with this problem, and if so, it can be given to patients and people around them because it often affects their psychology about infertility." (P5, R6-R7).

According to health workers, counseling is only needed if primary infertile women want it, but according to counselors, it will provide psychological services for infertile women if they get a referral from a fertility doctor.

Media and facilities

The results of interviews with five health workers about media and counseling facilities that are suitable for women with primary infertility are:

> "In my opinion, counseling is suitable if it has only been verbal so far. Maybe an interesting leaflet can be made that is easy for patients to understand or an interesting flipchart so that it will be expected to understand." (P6, R1-R5).

The results of interviews with two counselors about media and counseling tools that are suitable for women with primary infertility are that:

> "In my opinion, the appropriate media and facilities must be those that are easy for patients to carry and simple, and are prepared at every place while waiting so that it will be easier to read them, or banners or banners can be installed to motivate and motivate patients, maybe that's the right thing." (P6, R6-R7).

That media-related health workers choose interesting and simple ones, while counselors prefer media that are easy to carry for reading.

Method for counseling

The results of interviews with five health workers about counseling methods that are suitable for women with primary infertility are:

> "My opinion is that the method for infertile counseling patients is with face-to-face explanations, but if possible, so that it can be monitored online, maybe WhatsApp or other methods that are familiar to patients and easy to use, but face-to-face explanations will be clearer and more detailed." (P7, R1-R5)

The results of interviews with two counselors about counseling methods that are suitable for women with primary infertility are that:

> "If my opinion is face-to-face so I can see the response of facial expressions, eyes, and other attitudes that I can read, it will be easy to

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.241-250

provide appropriate counseling by paying attention to the response." (P7, R6-R7).

Health workers related to counseling methods can be in person or online, but the counselor's opinion is more accessible face to face.

Counseling flow

The results of interviews with five health workers about the appropriate counseling path for women with primary infertility:

"My opinion is that the flow of counseling from health services can be made clear. It is hoped that the counseling system can automatically be carried out into a package with clinical care. " (P8, R1-R5).

The results of interviews with two counselors about the appropriate counseling path for women with primary infertility:

"In my opinion that the counseling flow is made in detail in the section of each health service specifically for primary infertile women, there are standard procedures from health services that can have references so that patients with infertility do not have to wait for counseling only, but it has become a comprehensive service in it. There are health workers and counselors". (P8, R6-R7).

Therefore, based on the results, a model of a unified service can be developed, as illustrated in Figure 1. Integrating health workers and counselors can be a robust support system for treating women with primary infertility.

Discussion

The research found that understanding the definition of infertile women is essential. Following the findings in accordance with other research studies will support in explaining something that has been studied previously clearly and can make conclusions from the material and be able to apply the material that has been learned into real action (Jess Feist, Gregory J. Feist, 2018). So that health workers and counselors will understand and provide a lot of motivation for primary infertile women.

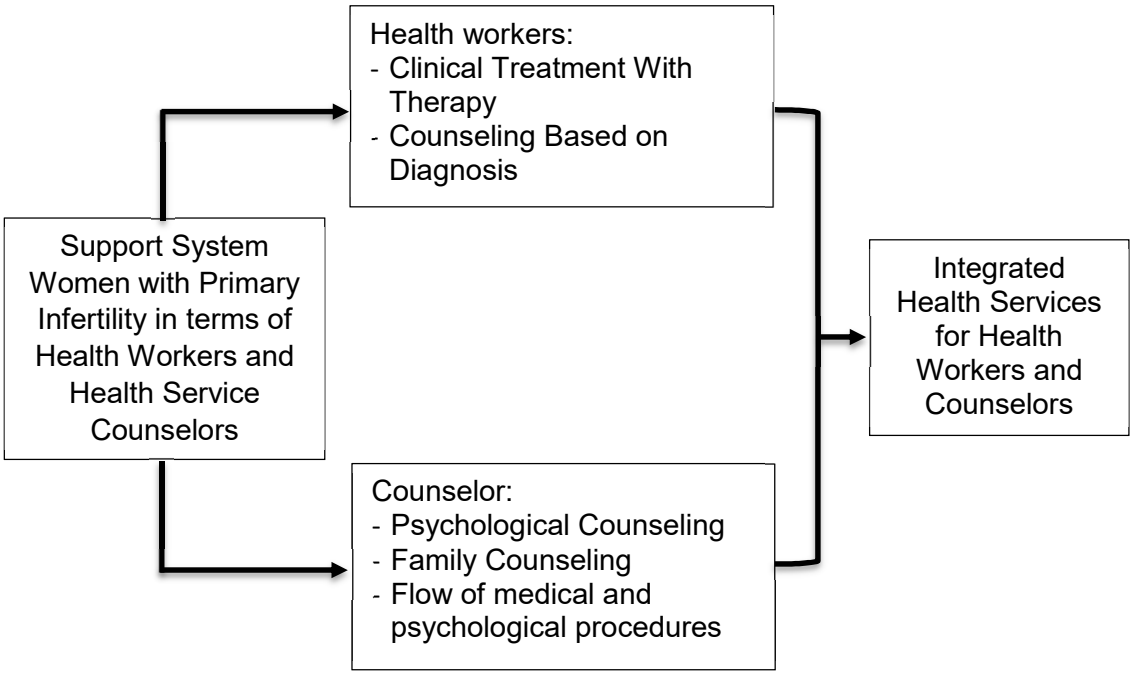

Figure 1. Integrated Service Model for Women with Primary Infertility

Indonesian Journal of Health Administration
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10.20473/jaki.v10i2.2022.241-250

In the discussion regarding infertility services, health workers will focus on clinical services because conditions must be assisted with curative. According to the counselors, infertility services need psychological support other than clinical to accept the situation without pressure. The most significant psychological stress is during fertility treatment, so clinical and psychological needs become a treatment system for patients with infertility (Ikemoto *et al.*, 2021).

According to health workers, research on counseling-related discussions provides information on clinical conditions. Anyone needing psychological services due to severe conditions will be referred to the service. It is different, according to the counselors, that clinically it is still given. Still, with the addition of preparing for psychological well-being, it is also given to facilitate fertility treatment. Following other research studies, receiving counseling was asked to all age ranges. The results generally showed different correlations with health outcomes; in this case, one was treated for infertility (Alvarez, Kawachi and Romani, 2017).

According to health workers, discussions on counselor-related research will be given to counseling services if it is in accordance with the patient's rights if they want to agree to go to counseling services. However, according to the counselor, it is scarce to receive referrals for infertile women because the form of assistance is different. This is different from other opinions relying on family. Psychological help and support can worry about the impact of fertility care on health, so educational and psychosocial interventions can support women and their families physically and psychologically during fertility treatment, stigma related to infertility, psychosocial support from family and the surrounding environment are aspects that need to be considered when planning an intervention program, especially in patients with infertility (Alvarez, Kawachi and Romani, 2017).

According to health workers, research discussing the relationship between counseling materials suitable for infertile women is more towards increasing fertility for primary infertile women. Meanwhile, the counselor that psychological support faced immediate infertility problems. Agree with other sources that materials, media, and facilities are needed for women with primary infertility. The materials required for women with primary infertility support and make the atmosphere of fertility treatment enjoyable and keep the procedures in fertility treatment in the form of media that is easy to understand and fun. While counseling is a process that occurs in a person's relationship with someone or individuals who experience problems that cannot be overcome, with professional officers who have received training and experience to assist clients in solving problems, where professional officers were health collaborations workers and counselors (Susanto, 2018).

The discussions on the relationship between media and suitable facilities for primary infertility women, and health workers, prefer attractive and easy-to-understand media and facilities. Meanwhile, according to the counselor, the link between media and more simple facilities is in the form of banners supporting primary infertile women with sentences that provide motivation. Where good media and facilities such as health education media are teaching aids in offering health education or health promotion and can be interpreted as aids for health education or health promotion that can be seen, heard, touched, or felt by facilities' communication and information dissemination (Jatmika *et al.*, 2019).

Discussions regarding the appropriate method for primary infertile women with health workers can be done offline and online in providing counseling methods for them because it makes communication easier. The difference with the counselor's approach is that the expected process is face-to-face so that

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.241-250

you can directly see and read the character of primary infertile women to provide psychologically appropriate solutions according to their needs. The method used is easy for the targets to understand, and the ideas or ideas contained in it must be acceptable to the target and the target to get a solution to the problem (Murti, 2018).

Discussions of the linkage of the counseling flow, according to health workers and counselors, argue that it becomes a comprehensive unit where women with primary infertility or with their partner's treatment, by research studies, regulate behavior to achieve the goals of someone who correlates with individuals, where the hope of infertile women to have children is realized and assisted with comprehensive support from health workers and counselors. The counseling flow in handling health services needs a clear and detailed flow so that health workers and counselors can run simultaneously and comprehensively in dealing with women with primary infertility following the results of research that infertility counseling centers can carry out for planning, implementation, evaluation, analysis, and supervision, comprehensive. Each counseling organization incorporates an integrated model of providing medical information and psychological support for infertile women and develops a phased care system (Choi and Lee, 2020).

Conclusion

It was concluded from the results of this qualitative study that the service between health workers and counselors still needs to be improved in the form of becoming a complete unit so that it can support the success of clinical and psychological treatment for women with primary infertility and become a reference source in improving counseling services for women with primary infertility. So health workers and counselors need an integrated support system of services for women with primary infertility.

Abbreviations

WHO: World Health Organization; BKKBN: Badan Kependudukan dan Keluarga Berencana Nasional; PERSI: Persatuan Rumah Sakit Seluruh Indonesia; P: Pertanyaan; R: Responden.

Declarations

Ethics Approval and Consent Participant

Respondents were provided with information about the study objectives and purposes before the interviews, and verbal consent to participate in the study was taken from them. Ethical approval from Central General Hospital and respondents was agreed upon and signed before the interview about the interview objectives and purposes, and verbal consent to participate in the study was taken from them.

Conflict of Interest

No significant competing financial, professional, or personal interests might have affected the performance.

Availability of Data and Materials

Data and material research can be provided upon request.

Authors' Contribution

MZR and ZS conceptualized the study; SW created the methodology; DP, MZR, ZS, and SW wrote, reviewed, and edited the manuscript; DP wrote the original draft.

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Literature Review

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TELEMEDICINE USE IN HEALTH FACILITY DURING COVID-19 PANDEMIC: LITERATURE REVIEW

Penggunaan Telemedicine di Fasilitas Kesehatan Selama Pandemi Covid-19: Tinjauan Literatur

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Abstract

Background: The policy of imposing restrictions on community activities during the Covid-19 pandemic is a challenge to the accessibility of health services. Therefore, we need the best solution for safe access to health services.
Aims: This study aims to analyze telemedicine use in health facilities during the Covid-19 pandemic by looking at comparisons and similarities in use and reviewing the inhibiting and supporting factors for the success of telemedicine.
Methods: The research method is a literature review that was obtained through the Scopus database and published in 2020-2021 in English. Cleaning of articles was carried out with the inclusion and exclusion criteria so that seven articles were reviewed.
Results: The lack of multidisciplinary use, healthcare practitioners' inability to connect with patients, under-integrated systems, and lack of technological knowledge and capacity all hinder telemedicine adoption. Positive patient feedback, a well-supported telemedicine service system, and partnerships with specialists all help make telemedicine more effective.
Conclusion: During a pandemic, the use of telemedicine in healthcare settings is extremely beneficial for healthcare providers and patients during healthcare consultations, and there are supporting aspects such as WHO recognition and simplicity of operation. However, obstacles remain, such as a lack of specialized knowledge and multidisciplinary technology.

Keywords: covid-19, health facilities, telemedicine

Abstrak

Latar Belakang: *Kebijakan pemberlakuan pembatasan kegiatan masyarakat selama pandemi Covid-19 menjadi tantangan pada aksesibilitas layanan kesehatan. Sehingga dibutuhkan solusi terbaik untuk akses layanan kesehatan yang aman.*
Tujuan: *Penelitian ini bertujuan untuk menganalisis penggunaan telemedicine di fasilitas kesehatan selama pandemi Covid-19 dengan melihat perbandingan dan persamaan penggunaan serta meninjau faktor penghambat dan pendukung kesuksesan telemedicine.*
Metode: *Metode penelitian adalah literature review. Artikel didapatkan melalui database scopus yang dipublikasikan pada tahun 2020-2021 dan berbahasa Inggris yang berjumlah 56. Cleaning artikel dengan kriteria inklusi dan eksklusi, sehingga didapatkan artikel yang diulas berjumlah tujuh artikel.*
Hasil: *Faktor penghambat penggunaan telemedicine, yaitu penggunaan belum bersifat multidisiplin, kekhawatiran praktisi kesehatan yang tidak bisa bounding dengan pasien, sistem yang belum terintegrasi, serta minim pengetahuan dan kemampuan teknologi. Faktor pendukung penggunaan telemedicine, yaitu respon positif dari pasien, sistem pelayanan telemedicine didukung penuh oleh pemerintah negara dan terintegrasi dengan spesialis.*
Kesimpulan: *Penggunaan telemedicine di fasilitas kesehatan pada masa pandemi sangat membantu penyedia layanan kesehatan dan pasien dalam konsultasi kesehatan. Faktor pendukung berupa pengakuan WHO dan kemudahan operasional. Namun, masih ada faktor penghambat, seperti belum multidisiplin dan kurangnya pengetahuan dalam penggunaan teknologi.*

Kata kunci*: covid-19, fasilitas kesehatan, telemedicine*

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10.20473/jaki.v10i2.2022.251-260

Introduction

The Covid-19 pandemic has made society cautious about coronavirus and, thus, implement health protocols (World Health Organization, 2020). As SARS-CoV-2 may cause mortality, WHO (World Health Organization) has confirmed the status of coronavirus as a pandemic (Calton, Abedini and Fratkin, 2020).

Mann *et al.* (2020) explained the need of telemedicine as the impact of pandemic era in the United States. The growth of this health service was rapid, making health insurance companies in the United States develop their business by providing telemedicine services which could be accessed from home (Mann *et al.,* 2020).

Current global situation needs the best solution in terms of access to safe and comfortable health services during Covid-19 era, since most health providers, like hospitals, focus more on Covid-19 patients. This situation triggers the development of e-Consults by practicians to see patient with non-procedural urological needs that are carried to emergency room (Gadzinski *et al.*, 2020). Nonetheless, the use of telemedicine in developing countries has yet to be effective due to limited technology access (Combi, Pozzani and Giuseppe, 2016).

This article aims to analyze the use of telemedicine in health providers during Covid-19 pandemic, compare the difference and similarities of its utility, as well as examine the barriers and proponent of telemedicine use.

Method

This study is a literature review with descriptive analysis which is able to describe certain research problem (Snyder, 2019). Literature review is needed to enhance the knowledge of research field that being analyzed, and as the base of comparation for previous research as well as improvement for future study (Winchester and Salji, 2016; The Writing Center, 2020).

To define inclusion and exclusion criteria, researchers used PICOT formulation of research questions. Population (P) is the whole object that will be analyzed using theme chosen by researchers. Intervention (I) is action that will be carried out to the issue. Comparation (C) is alternative actions to issue, while Outcome (O) is the result of previous study. PICOT also includes Theory (T) that explains the process or reason behind I and O relationship. Articles analyzed in this study were indexed by Scopus. We conducted the data collection from January 10th to July 5th, 2020.

Data Collection

The purpose of this research is to retrieve comprehensive information of telemedicine utility across countries. Articles were collected from Scopus with keywords “telemedicine” and “Covid-19” and “health facilities”. Inclusion criteria used in this research were articles published in 2020-2021, written in English, and matched the aim of study. Researches did not limit the articles based on country or method. The process of data collection was explained through PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta Analysis*) diagram.

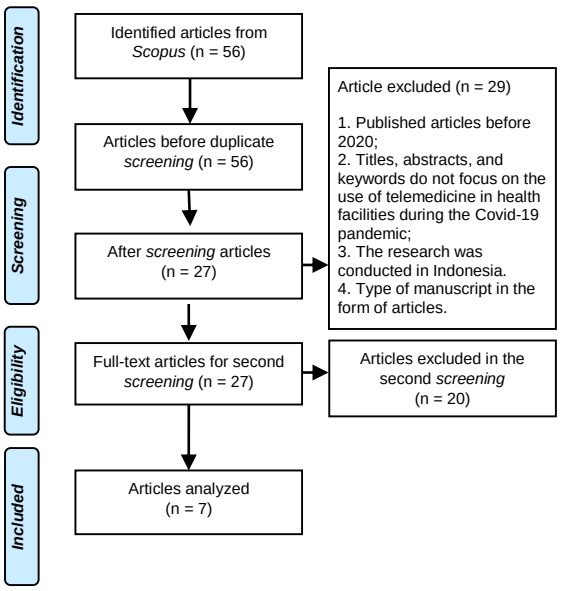

Figure 1. PRISMA Diagram of Literature Selection Process

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.251-260

Table 1. Literature Review Matrix

Authors, Country	Research Method	Research Purpose	Respondent	Mechanism of Telemedicine	Result
Conde-Blanco., et al., Spain	Online Survey	Effectivity of telemedicine use during pandemic	66 respondents of epileptologist in *Spanish Epilepsy Society* and *Catalan Neurology Society* epilepsy study group.	1. First visit through audio call; 2. *Follow up visit* using video conference platform such as *Skype, WhatsApp*, etc.; 3. Patients who want to consult the neurology and blood test would get their telemedicine schedule arranged after lockdown.	1. 56% respondents had experience with telemedicine and the rest just tried telemedicine in pandemic era 2. 88% respondents received telemedicine service using telephone while 4,5% respondents through video call, and 8% others come to the clinic and have conversation through the phone. . 3. From 60% of respondents who underwent surgery, only 27,4% explained it through phone. 4. About 78,8% of respondents showed interest to keep using telemedicine, and other 10% respondents showed less interest.
Aiken et al., United States	*Regression Discontinuity Design* (RDD), a quasi experimental evaluation method to evaluate program with intersection point, in order to decide eligible respondents	Assessment of increased demand in clinical abortion due to less accessible service in clinic	Online consultation form filling by 49,932 people.	Civilians requested *Self-management Abortion-care*, but government still required patients to come to health services to get mifepristone.	1. The demand of self-managed online telemedicine for clinical abortion had reached 49.932 cases since 2019 and had 27% of increase in March-May 2020. 2. Highest demand came from Texas (94%). 3. There were possibilities that society would choose non-medical services if their demands could not be fulfilled in pandemic era.
Ghai et al., India	Descriptive	Not explained	Not explained	1. Patients used audio, video, email, and fax as communication tools. 2. Ethical codes of services provided online must be the same with offline services while health practitioners must complete cumpolsory online course; 3. Health practitioners must show registration number while giving services, and patients were not allowed to give personal data without written consent. 4. Consultation given must be in line with health services category	1. Ministry of Health built telemedicine service for chronic illness. 2. The regulation included technical guide, rules, and so on related to audio, video, fax, and email use as tools. 3. Government considered telemedicine essential service as it helped to prevent exposure of coronavirus to people inn hospitals. 4. *Telemedicine* could minimize operational costs and human resources.
Darr et al., United Kingdom	Online survey using four validation indicators.	Covid-19 impact evaluation to pediatric ENT outpatient service by collecting patients feedback.	225 patients were randomly selected to be reviewed, and 20 patients were chosen to assess *Virtual Outpatient Clinic* (VOPC) service satisfaction.	1. Health providers gave information and pre-consultation confirmation through email and telephone; 2. New patients and follow-up patients used telephone to consult; 3. Patients used video conference through *AccuRx* and *Zoom* to consult their surgery results or any visualization that must be assessed by practitioners.	1. 514 patients participated in 144 provided VOPC which were handled by seven professionals. 2. Most of patients utilized follow-up services (170 patients). 3. 79% patients visited VOPC with scheduled arrangement 4. Virtual tools used by patients were telephone (185 patients) and video conference (15 patients). 5. From 20 patients chosen, 99% of them felt satisfied and veru satisfied about patient-doctor relation which was reliable and private. 6. About 98% respondents gave positive feedback related to consultation. VOPC bring impact to the decrease of direct visit to clinics, from 15% before pandemic to 2,5% during pandemic.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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Authors, Country	Research Method	Research Purpose	Respondent	Mechanism of Telemedicine	Result
Al-Sofiani et al., Saudi Arabia	Online Survey	Description of telemedicine protocol in diabetes clinic provided for patients and health care providers (HCP) as well as patients and HCP satisfaction virtual report	More than 300 patients in the first four weeks	1. Patients used gadget with audio and video that was connected to internet. Platform used for service including zoom, *Continuous Glucose Monitoring* (CGM) system, and *Self Monitoring of Blood Glucose* (SMBG) to share patients latest condition through pictures; 2. Patients fulfilled scheduling form via google form; 3. Health practitioners arranged schedule and duration of consultation; 4. Health services prepared and sent medicines to patients; 5. Routine virtual education session; 6. Patient satisfactory survey	1. From more than 300 patients who came to the clinic in the first four weeks, about 145 from 150 patients evaluated their experience in receiving services. 2. About 210 patients expressed satisfaction, and patient request feature received 450 requests with blood glucose level check was the most requested service (31%). 3. 93% of respondents stated that services were easy to access and 71% of them explained the fulfilled purpose of check up Ramadan virtual session was considered adding knowledge to 97% respondents. 4. About 88% respondents agreed that session would be held yearly even after pandemic was over.
West, United States	Descriptive	Unexplained	Unexplained	1. Cancer outpatients could access the system through website and application in smartphone named *AccessHope*. 2. Patients performed the consultation with oncologist through *Live* or televideo; 3. Patients with medical records who wanted to be undergo further assessment, *AccessHope* would offer the service from the nearest clinics.	1. Centers for Medicare and Medicaid service (CMS) stated that 80 services would be provided through telemedicine system, and payment of service would be standardized as usual on-site visits. Family members information would also be integrated to the system. 2. Some cancer clinics integrated conference video of patients with the oncologists. Digital supervision was provided as well, improved from the previous method using web camera.
Biswas et al., India	Online survey	Assessment of doctors giving palliative care to cancer patients and its obstacles, result discussion, and response evaluation of care with telemedicine.	314 patients who used telemedicine patients in March 25th – May 13th 2020	1. Health services integrated data to system in Android clinic; 2. Before pandemic, patients follow-up was conducted using audio calls only; 3. Patients accessed contacts in official clinic website; 4. Patients used calls and video calls from *WhatsApp, Massanger, E-mail,* and *Skype* which were provided 24 hours in a week under practitioners supervision.	1. About 167 patients used audio calls and messages (53.18%), 84 patients used video calls (26,75%), 224 patients used telemedicine to take opioids under practitioners supervision, 157 pasien (50%) sought for check-up and symptoms detection, and 86 patients (27.39%) needed more opioids. 2. The reasons of telemedicine use included difficult transportation access (124%), categorized as terminal patient (88%) and afraid of being exposed to Covid-19 (71%). 3. Patient satisfaction level showed that 208 patients were satisfied and very satisfied, while 106 patients felt unsatisfied and very unsatisfied.

Indonesian Journal of Health Administration
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Result and Discussion

About 56 articles were screened in the first phase and 29 articles were excluded because of unmet inclusion criteria. After conducting second phase of screening, researchers selected 7 articles to be analyzed further based on phenomena, result, and conclusion explained by related study. Those 7 studies were conducted in United States, India, Spain, Saudi Arabia, and United Kingdom. The result of literature review on related 7 articles were described in table 1.

Conde-Blanco *et al*. (2020) study in Spain explained that pandemic made 44% respondents utilized telemedicine for the first time, and 78,8% respondents intended to use telemedicine after pandemic era. Research conducted in United States (Aiken et al., 2020) also stated the urgency of telemedicine service for clinical abortion, which should be fulfilled to prevent the use of non-medical services by society. Meanwhile, West (2020) study that was also took place in United States showed the use of integrated video conference for both patients and practitioners.

Telemedicine in India was initiated by the Ministry of Health as an effort to avert the spread of Covid-19 among patients with chronic illness, as well as operational costs and human resources efficiency (Ghai et al., 2020). Telemedicine method was described through government regulation that explained the use of audio, video, fax, and email for giving services. Other study in India justified in detail the implementation of telemedicine using calls and messages for palliative care (Biswas et al.,2020).

Based on Darr *et al.* (2020) study in United Kingdom and Al-Sofiani *et al.* (2020) in Saudi Arabia, *telemedicine* service carried out in pandemic era resulted in high patient satisfaction level. Research conducted in United Kingdom showed that 99% patients felt satisfied and very satisfied of telemedicine care, and 210 out of 300 patients who used telemedicine stated similar level of satisfaction.

All 7 articles explained the possibilities of telemedicine service even if the pandemic era had passed. Telemedicine would be utilized for both clinical and non-clinical service. Telemedicine use was carried out as a form of operational costs and human resources efficiency in government level of program. Telemedicine might optimize the reliable and private relation between patients and practitioners. Telemedicine could be provided using digital supervision and video conference, which would surely bring ease to patient with difficult access to health providers.

The results of 7 articles indicated the massiveness of telemedicine care during pandemic. Telemedicine also made it easier for society to access health information from many platforms, such as *WhatsApp*, messanger, email, and so on.

Table 2. Similarity and Dissimilarity of Telemedicine Use in Health Providers during Covid-19 Pandemic Era

Aspect	Similarity	Dissimilarity
The use of tools	Communication tools with calls and video conferences based were used in all reviewed article.	Specific integrated system was used for certain medical tests (*Continuous Glucose Monitoring* (CGM) and *Self Monitoring of Blood Glucose* (SMBG) were only stated in Al-Sofiani, *et al*. study)
Services given to patients	Patients follow-up services were explained in all reviewed articles.	Health services website was used (Palliative care official website in India which studied by Adhikari, *et al*. and *AccessHope* website from *City of Hope Comprehensive Cancer Center* in West H. J. study)
The use of media	Telephone was the most used tool in all reviewed articles.	Menyelesaikan *cumpolsory online course* untuk praktisi kesehatan hanya ditemukan di klinik *telemedicine* untuk penyakit kronis di India (Babita Ghai *et al*.)
Services session	Patients must come to the clinics to take their prescription (all reviewed articles, except diabetes clinic in Al-Sofiani, *et al*. study).	Education session to support health services provided Sesi Edukasi sebagai komponen pendukung pelayanan pasien (*Virtual "Diabetes and Ramadan" Educational Sessions* in Al-Sofiani *et al*. study which included education related to dietary, sport, blood glucose moitoring, and carbohydrate calculation during Ramadan).

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.251-260

Based on table 2, there was significant similarity of platform used in all reviewed articles. But the integrated health system used to carry out medical check-up was only found in Al-Sofiani, *et al*. All studies performed follow-up services for patients. Different from other studies, Adhikari *et al.* and West H.J found the use of official health services website. Furthermore, all researches stated the use of telephone as the most preferable tool compared to video conferences. Bhabita Ghai et al. showed that *cumpolsory online course* for health practitioners was found in telemedicine clinic for chronic illness in India. During the session, all studies except for Al-Sofiani, *et al*. explained that prescription must be taken directly to the clinic after consultation session. Al-Sofiani et al. stated the availability of education session to support services given to diabetes patients which included dietary and physical exercise suggestion, blood glucose level measurement and monitoring, as well as carbohydrate count during Ramadan.

Based on our synthesis, some articles defined that telemedicine use in health care facilities indicated the effective utilization of telemedicine by patients. Telemedicine was carried out by providers as a way to ensure the availability of services during pandemic with minimizing the spread of coronavirus and enhancing cost and other resources efficiency. Respondents or services users gave positive feedback, stating that most of them felt satistfied and very satisfied to services given (Darr *et al.*, 2020; Al -Sofiani *et al.*, 2020). Moreover, researchers also found some obstacle and supporting factors which contribute to the success of telemedicine services.

Obstacle Factors

The use of telemedicine has not applied based on several disciplines or fields. This is due to the absence of professionals from other fields which also have related work to health services. For example, patients' caretaker must be involved in consultation or services carried out, considering the mental health status of patients during pandemic. Telemedicine should had recognized the current mechanism applied that brings impacts to both patients and their caretakers mental health (Biswas *et al.*, 2020).

Telemedicine is able to provide video conference that enabling all professionals needed for services in one meeting. Regarding to the lack of multidiscipline application of telemedicine, this may be the result of nonexistence regulations related to telemedicine which applied globally. There are some divergent regulations of telemedicine use across the countries, different cultural and social norms, as well as policies that might be contrast with telemedicine practice which carried out across jurisdiction borders.

Furthermore, there are some concerns of practitioners regarding their bounding process with patients. West (2020) explained that first impression was very important in practitioner and patient relation. Most of practitioners observe that the first meeting with patients through telemedicine cannot give *good-enough impression* to patients because the chemistry between practitioners and patients cannot be built directly. Emotional topics will be difficult to be discussed, especially for sensitive topics. Practitioners are worried that this impression may affect the relation with patients negatively.

Meanwhile, there are telemedicine services which have not been integrated systematically. Study by West (2020) showed that health services might provide gadget equipped by internet service and limited service for telemedicine use that can be borrowed by patients. There were several icons shown in gadget to access the system directly, and simplify the process for patients with limited knowledge of technology. Furthermore, health care

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.251-260

facilities also provided educational video related to several illness.

The lack of knowledge and ability to access technology also became a significant barrier for patients in rural areas (Ghai, Malhotra and Bajwa, 2020). There are large numbers of patients who do not understand how to operate gadget and use internet. Most rural areas also do not have access to internet access. Telemedicine system needs these two components, making it hard for patients to access telecommunication-based health services in such condition. Health care in related countries may need to integrate the system with other family members who are able to use internet, in order to help patients while preparing to access services until the consultation given.

West (2020) also explained that telemedicine session which was merged with on site services made consultation process run inefficiently. Patients hoped that health facilities separated practitioners who worked on site and via telemedicine, as it had impacted the time of services carried out. Patients felt that the service could not be given on time, and practitioners were overworked. The impacts would be significantly felt if the onsite services were full.

Some improvements which must be done to mechanism and technical regulations of telemedicine include tools optimalization, integrated system, and standardized protocols of telemedicine which globally applied. Not only from technical perspective, but also from policy perspectives. Study conducted by Aiken et al. (2020) showed that almost all people from federal states in United States expressed their wants of telemedicine. This is due to the increase of abortion cases and limited access to health services. Thus, telemedicine can be an alternative to prevent non-medical service used by patients.

Supporting Factors

World Health Organization (WHO) plays the important role in public health issues across the world, including the telemedicine utilization as part of alternative solutions during pandemic. Aiken et al., (2020) described the way WHO gave recommendation about telemedicine and abortion services during pandemic. The WHO statement has impactful meaning to countries or states, to start using telemedicine.

Moreover, most patients respond positively to telemedicine service. Based on Kludacz-Alessandri *et al.*, (2021) study, health providers in several countries which had utilized telemedicine received positive feedback from patients. After analysing all seven articles, researchers concluded that most studies reported more than 70% patient satisfaction proportion to telemedicine service. This accomplishment surely supports the use and possible improvement of telemedicine in health field. Patients and other targets of health program will acknowledge the benefits of telemedicine even after the pandemic is over. If health services can improve and maximize the potentials of telemedicine, telemedicine might be the primary service preferred by patients or society (Kludacz-Alessandri *et al.*, 2021).

Telemedicine system is fully supported by most of governments. Some telemedicine clinics explained the government support in the form of policy. A clinic in India which specialized in chronic illness was handled directly by Ministry of Health in terms of mechanism and other technical issues. The mechanism of telemedicine use had been described in detail, from eligible criteria for doctors until the mechanism of conducting consultation (Ghai, Malhotra and Bajwa, 2020). This support is an important key for telemedicine future, as it will provide the regulation of telemedicine care which also rules the rights and obligation of patients.

West (2020) study in *City of Hope Comprehensive Cancer Center* explained

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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how telemedicine integrated some specialists. It had several features such as live video conference or directly with the oncologists. Not only consultation service, they also provided the assessment of patients' medical record and gave recommendation to nearest oncology clinics. Telemedicine was expected to offer psychological aid and stress reliever, whether individual or in groups. (Kholipah and Dhamanti, 2021). Integrated telemedicine service with specialists in certain field will bring greater impact to telemedicine advancement. Telemedicine proved that this kind of service is not less reliable compared to conventional type of service, as providers also come up with professionals in health field. So telemedicine is indeed an excellent alternative to onsite services.

Based on our analysis regarding both obstacle and supporting factors, researchers argue that telemedicine still needs some enhancement in the future. Providers might examine the possibility of patients' participation to ensure their satisfaction of service. Telemedicine future development is also probably affected by obstacle factors explained. Authors believe that government and health providers may boost the quality of telemedicine by providing integrated media or system, more efficient and easier mechanism, and any other supporting policy to reinforce the establishment of telemedicine.

Conclusion

Telemedicine has bright future in health field. Main supporting factors of telemedicine use during Covid-19 pandemic is sufficient service for patients with health practitioners including specialists. Moreover, government support is administered through policy related to telemedicine implementation. Some aspects needed to improve telemedicine success are WHO acknowledgment, patients' positive feedback, supported system by government, and integrated service with specialists. On the other side, main obstacle factors to telemedicine utilization during pandemic are lack of knowledge and ability to use technology, especially for elderly patients. This remains unsolved for patients in area with limited access to technology. Telemedicine still also needs some strengthening from technical and policy aspects.

Health care should implement multidisciplines integrated system to telemedicine service. Furthermore, health providers might add more sessions to build personal bonding between practitioners and patients, using education session for example. Establishment of media and technology as main supporting tools to provide services is an obligatory. Government should improve the types of telemedicine tools, equally distribute access to technology including both technical and educational resources of technology.

Abbreviations

WHO: World Health Organization; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta Analysis; RDD: Regression Discountinuity Design; VOPC: Virtual Outpatient Clinic; HCP: Healthcare providers; CGM: Continuous Glucose Monitoring; SMBG: Self Monitoring of Blood Glucose; CMS: Centers of Medicare and Medicaid Services.

Declarations

Ethics Approval and Consent Participant

This research does not applicable ethics approval and consent participant.

Conflict of Interest

The authors declare that there are no significant competing financial, professional, or personal interests that might have affected the performance.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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Availability of Data and Materials

Data and material research can be provided at open data repository (OSF, Zenodo, Repositori Ilmiah Nasional, Institutional Repository Data and etc.) or by upon request.

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Not applicable.

Authors' Contribution

WHM and ID conceptualized the study; WHM, APR, ID created the methodology; WHM and ARYP wrote, reviewed, and edited the manuscript; WHM and ARYP wrote the original draft; APR as an English translator and English grammar editor in this draft; ND as content analyst and Indonesian grammar editor.

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Literature Review

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A LITERATURE REVIEW OF TELEMEDICINE IN INDONESIA: PAST, PRESENT, AND FUTURE PROSPECTIVE

Tinjauan Literatur Terkait Perkembangan Telemedicine di Indonesia: Dahulu, Sekarang, dan Masa Depan

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Abstract

Background: Indonesia has a great potential in the development of digital health technologies. However, several challenges might also arise in hand with the development of telemedicine.
Aims: We aimed to conduct a literature review of the use of telemedicine in Indonesia in order to know how the start is, the development, and future considerations of its usage.
Methods: From the digital databases of PubMed, Google Scholar, and Neliti (Indonesia's Research Repository), each author completed literature searches of telemedicine in Indonesia from 1985 to 2021.
Results: A total of 8 studies were included in current literature review. In 1985-1987, Indonesia undertook the first satellite-based telemedicine. During the early twenty-first century, rapid improvements in information technology have expanded to other industries, including health care through telemedicine. Covid-19 dilemma compels physicians to adopt. Through telemedicine, many is experienced the benefit during the pandemic. However, in developing telemedicine system for the future, the use of telemedicine has several challenges, namely related to human resources, infrastructure and ethical regulations.
Conclusion: When telehealth is successfully implemented in Indonesia, it will benefit both the developer and the consumer. Despite the benefits, the challenge of implementing and developing a comprehensive eHealth environment in Indonesia might be seen as tremendous, given that the country is currently developing its infrastructure.

Keywords: Covid-19, Indonesia, satellite, telemedicine

Abstrak

Latar Belakang: *Karena sedikitnya literatur yang ada, sangat sedikit yang diketahui mengenai perkembangan telemedika di Indonesia.*
Tujuan: *Kami bertujuan untuk melakukan tinjauan literatur mengenai perkembangan telemedika di Indonesia untuk mengetahui bagaimana permulaan, perkembangan, dan pertimbangan penggunaannya di masa depan..*
Metode: *Dari beberapa database digital, seperti PubMed, Google Scholar, dan Neliti, masing-masing peneliti menyelesaikan penelusuran literatur telemedicine di Indonesia dari tahun 1985 hingga 2021.*
Hasil: *Sebanyak 8 studi dimasukkan dalam tinjauan literatur saat ini. Pada 1985-1987, Indonesia mengimplementasikan telemedika berbasis satelit untuk yang pertama kalinya. Selama awal abad 21, kemajuan pesat dalam teknologi informasi meluas ke industri lain, termasuk kesehatan melalui telemedika. Dilema Covid-19 memerlukan dokter untuk mengadopsi. Melalui telemedika, banyak manfaat yang dirasakan. Namun dalam mengembangkan sistem telemedika ke depannya akan ditemukan beberapa tantangan yaitu terkait dengan sumber daya manusia, infrastruktur, dan masalah etika.*
Kesimpulan: *Ketika telemedika berhasil diterapkan di Indonesia, maka akan sangat menguntungkan dalam banyak aspek. Selain itu, tantangan untuk mengimplementasikan dan mengembangkan telemedika di Indonesia mungkin akan sangat sulit karena Indonesia sedang mengembangkan infrastruktur teknologinya.*

Kata kunci*: Covid-19, Indonesia, satelit, telemedika*

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Introduction

Indonesia as the world's fourth-largest population has a great potential in the development of digital health technologies. The technology may assist Indonesia citizens in accessing healthcare way easier than ever before (Tuckson, Edmunds and Hodgkins, 2017) This will benefit the country's more than 260 million individuals across the country (*Population, total - Indonesia | Data*, 2018) The development and innovation of eHealth, which enables users to share and search for the most recent information, long-distance consultations with doctors, including e-prescribing, and exchange of patient health records, is what's driving the digital revolution in the health industry. (Tuckson, Edmunds and Hodgkins, 2017).

Telemedicine has the potential to shift care from a practice-cantered model to a patient-cantered model, reducing travel time or requesting for a school or work leave. However, there is no universally accepted definition of telemedicine at this time. Telemedicine, telehealth, and eHealth are all concepts that are frequently used interchangeably (Hilty *et al.*, 2013). These are the terminology used to describe how information technology systems are utilized in the healthcare industry to improve communication between patients and healthcare professionals, especially those who live in remote locations. Telemedicine, according to the World Health Organization (WHO), is the use of information and communication technology to provide health care, particularly in areas where access to medical services is limited. (WHO Telemedicine, 2010) Telemedicine is traditionally defined as the delivery of medical treatment through the internet using audio-visual technology. (Grossman *et al.*, 2020) Telehealth is the use of medical devices, activity trackers, automated reminders, blood glucose monitors, and other tools to collect and send health information, frequently with the aim of monitoring or managing chronic illnesses. It also includes telemedicine technologies. Telehealth can also aid in the development and improvement of health-related education, health management, and general public health (Edirippulige and Armfield, 2017).

The term 'eHealth' is also used in several European countries to designate digital health and technology-driven remote health care. Before 1999, this term was little in use; it now appears to serve as a general buzzword, describing not only internet medicine, but also nearly everything related to computers and medicine. They coined this term, along with others like e-commerce, e-business, e-solutions. The word eHealth is often used to refer to a broader range of digital information tools, such as electronic health records, which makes it easier for health care practitioners to share patient data. Computerized physician order entry systems, e-prescribing, and clinical decision support technologies are examples of eHealth, which offer physicians with electronic information on protocols and standards for diagnosing and treating patients. (Edirippulige and Armfield, 2017).

However, due of the limitation of small number of published literatures, little is known about the development and the effectiveness of telemedicine use in Indonesia. Doctors are also less familiar with telemedicine since they are unaware of the implications of its use in any medical practice. During the COVID-19 pandemic, clinicians will attempt to use this technology for outpatient care in order to facilitate access and convenience of care. Several challenges might also arise in hand with the development of telemedicine in Indonesia, such as human resources, infrastructure and ethical regulations (Kawaji *et al.*, 1990). Thereby, we aimed to conduct a literature

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

review of the use of telemedicine in Indonesia in order to know how the start is, the development, and future considerations of its usage.

Method

From the digital databases of PubMed, Google Scholar, and Neliti (Indonesia's Research Repository), each author (G.S, L.R, and J.H) completed literature searches of telemedicine in Indonesia from 1985 to 2021 on 17 September 2021. As far as the available documentation, telemedicine practice was initially trialled back in 1985. As such, we included studies in 1985 afterward. We used the terms "telemedicine", "telemedika", "telenursing", "remote consultation", "telehealthcare", "telemonitoring", "remote monitoring", "tele-education", "health messages", "remote diagnosis", "telediagnosis", "teleconsult", "mobile health", "mHealth", "eHealth", and "Indonesia". We conducted literature searches from 1 January 1985 until 17 September 2021. From 1347 published scientific articles, 337 studies were deleted due to duplicates. Following title and abstract screening, we selected 35 articles for full text screening. The authors excluded 18 studies for not reporting the key interests, 3 meeting abstracts, 4 studies conducted not in Indonesia, and 2 studies duplicate. We deemed 8 studies to be eligible for current literature review. We collected all reports on telemedicine use in Indonesia with restrictions to English and Indonesian language. Telemedicine refers to the use of electronic communications channels or mediums and information technology to deliver clinical services. As the primary endpoint of our study, articles were required to give original data on telemedicine use in Indonesia. We exclude narrative, conference abstracts, commentary, perspective, and opinion. Nonprimary literature was excluded due to lacking credibility. However, we still retrieved studies from a systematic review, abstracts, and other nonprimary literature references to ensure literature saturation. The approach we used for current review is traditional review.

Initially, each author (G.S, L.R, and J.H) screened the title or abstracts for extracted articles from each electronic source. After that, we read the remaining pieces in full paper format and decided which papers were eligible for our study. Any discrepancies were resolved through discussion by the authors. We critically appraised the quality of included studies using the Joanna Briggs Institute (JBI) for case report or Newcastle-Ottawa Scale (NOS) as appropriate.

For data extraction, we collected the demographic characteristics (total patients, age, and sex), publication year, medical fields (e.g., neurology, cardiology, or other), study design, and results from each study.(Suksmono *et al.*, 2014) We aimed to conduct a literature review of the use of telemedicine in Indonesia in order to know how the start is, the development, and future considerations of its usage.

Result and Discussion

Historical start of telemedicine in Indonesia

In 1985-1987, Indonesia undertook the first satellite-based telemedicine trial and other academic activities as part of the SHARE (Satellite for Health and Rural Education) project supported by Intelsat to honour its their anniversary. (Abdulrachman and Abdulrachman, 1991) Practice of teleconference was reported to be first used in Indonesia in the 1985, between an Indonesian National University and the World Health Organization (WHO). The data that was transferred was in text format (Suksmono *et al.*, 2014).

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

Indonesia completed a low-cost "Still Picture Transmission by Narrowband Technique" for educational and medical services in the early 1990s, followed by a series of image processing studies on a laboratory scale. Pan Asia-Pacific Region Telecommunication Network for Tests and Research by Satellite (PARTNERS), a cooperation financed by Japan's Myanmar Posts and Telecommunications and managed by the Association of Radio Industries and Businesses, was established to undertake experiments on Engineering Test Satellite-Five L-Band transmission and related applications (Suksmono *et al.*, 2014). Slow scan video lectures were held among our PARTNERS members (1992-1997) (Nakajima *et al.*, 2001). Educational and medical messaging can utilize this type of application conducted by Tokai University's School of Medicine, which is one of the partners for ITB (*Institut Teknologi Bandung*) school of engineering. In 1997, a satellite-based telemedicine experiment was conducted between the UNJANI (*Universitas Achmad Yani*) Faculty of Medicine and Engineering in Bandung as the centre/control station, the Central Hospital of Mataram, and the *Harapan Kita* Hospital in Jakarta (Nakajima *et al.*, 2001). The trial was on maternal care using a television in order to conduct the trial in Indonesia's eastern territory. Another post-PARTNERS telemedicine experiment was a wireless-based telemedicine system that connected one university hospital and one university in Bandung, Hasan Sadikin Hospital and UNJANI via JCSAT 3 satellite-linked between ITB and Ohkura National Hospital in Japan (Tedeschi, 2020). Another telemedicine activity was carried out in the ITB's Biomedical Laboratory. The research team created an internet-based telemedicine system for the country's Primary Community Health Centre (*Puskesmas*). Tele-consultation, basic tele-diagnostic, tele-coordination, tele-education, and medical databases are among the services provided (Suksmono *et al.*, 2014).

During the early twenty-first century, rapid improvements in information technology have expanded to other industries, including health care through telemedicine. Despite the governmental decree on initiating telemedicine practice (tele-ECG) in 2011, (*Menteri Kesehatan Republik Indonesia*, 2020) there have been several medical researches of telemedicine in 2004. Telemedicine via an internet connection was developed for the Community Health Centres (*Puskesmas*) which supported teleconsultation, telediagnosis, simple tele coordination, tele-education, and drug databases, among other applications (Suksmono *et al.*, 2014). In the same year, a telebiomicroscopy was developed by the Research Group of Padjajaran University's Faculty of Health (Suksmono *et al.*, 2014). A wireless communication channel in this system was used to transmit a microscopic description of an eye condition. As a result of the findings, it was determined that an eye illness diagnosis might be performed remotely utilizing a telemedicine system. Another experiment was carried out in a compromised hemodynamic state, with vital patient data provided over a communication link. The outcome of the experiment was also encouraging (Suksmono *et al.*, 2014).

A web-based medical information system for broad communities has been created by PT Telkom (Indonesia's national telecommunications corporation). Teleconsultation and tele-education were implemented as part of another trial called MediFa, which uses a videophone to connect primary care clinics and referral hospitals. This technology was expanded over the next few years to include video streaming, Short Message Service, and Wireless Application Protocol for usage by

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

family doctors. (Nugraha and Aknuranda, 2017) Telemedicine continued developing until 2005, and until then, Indonesian engineering established an ICT-based e-health system designed for epidemic management. For a web-based epidemic management system and a mobile phone-based system with multiple communication links, many e-health prototypes have been developed. A mobile communications system was created by teams from the hospital, various health service units, and the ambulance in order to determine what equipment was easily available (Soegijoko *et al.*, 2011). Mobile telemedicine was created up until 2007 as a component of a tele-emergency effort to provide medical care in remote areas. A mobile telemedicine system prototype that consists of both hardware and software could be swiftly set up in rural locations or at disaster sites where the communications infrastructure has collapsed (Shimizu *et al.*, 2010).

Telemedicine applications were first launched in 2010 as part of a biomedical technique that included a simple block diagram and multiple disciplines. E-health applications were developing to provide real-time connections between medical stations and terminals for teleconsultations between general practitioners and specialists. That store-and-forward can be used to distribute a short report about patient recapitalization at a community health centre. In 2011, short message service technology for streamed audio and video data in a mobile setting was used to develop e-health applications for disease detection (Shimizu *et al.*, 2010). To assist with patient and pharmaceutical data, an e-prescription system with a mobile e-health system for child and mother therapy was built in the same year. The SMS module in this system can transmit short messagesin various operation modes. An SMS software module and a modem connected to a PC-based e-health system constitute an e-prescription for mobile e-health, in essence. (Nugraha and Aknuranda, 2017) Telemedicine vastly developed the focus on mobile-based health systems. As of 2018, the government manages seven network-based health care applications and 18 private online health service applications. Although various platforms provide online health information and services, many Indonesians have yet to use this app. According to a poll performed between May and July 2018, 67.6% of 102 respondents have never used an online health service application (Husni *et al.*, 2006).

Before the pandemic

Health service innovations in the digital era help patients use their time more efficiently, such as reduction in hospital traveling time and health facilities for consultations. There are 7 network-based health service applications managed by the government and 18 private online health service applications which can be seen from Table 1 (Husni *et al.*, 2006). Until now, there have been no permanent regulation in implementing telemedicine, considering that currently only circulars issued by the Minister of Health, such as *Menteri Kesehatan Nomor 20 Tahun 2020 tentang Pentelengaraan Pelayanan Telemedicine Antarfasilitas Pelayanan Kesehatan* and *Surat Edaran Menkes Nomor 303 Tahun 2020 tentang Penyelengaraan Pelayanan Kesehatan dengan Teknologi Indoenamsi selama Pandemi* COVID-19. This is where the role of the Minister of Health and the *Badan Penyelenggara Jaminan Sosian* (BPJS) plays a role. BPJS is conducting a trial of telemedicine financing for participants of the National Health Insurance (JKN) for referrals using a system called Indonesia Case Base Group (INA-CBG).(*Deloitte 2019*, 2019) INA-CBG is a payment system with a package

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

system that has been established for both public and private hospitals. It is based on the patient's disease and the technique of paying for patient treatment based on cases or diagnoses that are generally comparable. In addition, JKN tariff revisions are being discussed to include telemedicine financing. In the current JKN era, 1,227 hospitals have implemented the INA-CBG. (*Deloitte 2019*, 2019).

The number of supporting health centres for telemedicine programs in five years is developed according to the road map of the Indonesian Ministry of Health. The Ministry of Health's 5-year (2015-2019) telemedicine program roadmap is prioritized for poot regions and islands or called as *Daerah Tertinggal Perbatasan dan Kepulauan* (DTPK) where health facilities are very difficult to be accessed by the community. The target of telehealth facilities by the Ministry of Health is prioritized at 120 tertiary healthcare facilities in the DTPK or also known as "*Puskesmas*". The target of the referral hospital programmed in 2015 is around 3 supporting hospitals. The target for 2019 is to reach 42 referral hospitals. The telehealth program in this study was started in 2016, with a target of eight supporting hospitals. If it is assumed that the number of health centres supported by each supporting hospital is 10 health centres. The number of puskesmas trained in the first year (2016) was 80 puskesmas. The number of densely packed health centres in 2020 will reach 680 health centres. The target of this telehealth program is for areas outside the border and underdeveloped. This program will be successful if the area has access to electricity and is affordable by data services at least third generation (3G) technology. (Indonesia Ministry of Health, 2018a).

Table 1. Online health service applications managed by the government and private.

Government	Private
Layanan kesehatan ke rumah 24 jam berbasis telemedicine dan teleradiologi di Makassar (Dottorro'ta)	Alodokter
JKN Mobile	GO-MED
Verifikasi Digital Klaim/Vedika BPJS	Gue Sehat
Acquired Immunde Deficiency Syndrome (AIDS) Digital Application	HaloDoc dan GoApotik
TeleEKG, TeleUSG, TeleKonsultasi, dan TeleRadiologi	Homedika
P-Care BPJS	Homecare24
Application for outpatient registration	Indonesia Kalkulator of Oocyte
	K24 Klik
	Klik Dokter
	Medika App
	Medico
	MIMS Indonesia
	PesanLab
	periksa.id
	Pro Sehat
	RSPI Mobile
	TeleCTG
	Sehati

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

During the pandemic

The Covid-19 epidemic has triggered a global crisis that is putting an unprecedented strain on the healthcare system. Hospitals with a high number of Covid-19 patients that require immediate care influence medical personnel's health and the necessity for personal protective equipment. Surgeries, technology, and expertise can all provide challenges for doctors when performing medical treatments. Because doctors are unfamiliar with the current conditions, the current Covid-19 dilemma compels physicians to adopt technology that they do not understand. Additionally, in order to scale up the healthcare systems and modernize healthcare delivery as healthcare systems across the nation get ready for an inflow of Covid-19 cases, quick action is required. (Ventura, Gibson and Collier, 2020).

Patients with chronic conditions are treated at home according to their physician's instructions and directions during the current Covid-19 pandemic. By utilizing the digital technologies, physicians can monitor the patient's progress without having to visit the patient. Patients with chronic conditions may have comorbidities that increase the chance of Covid-19 infection worsening; thus, healthcare providers must make efforts to limit Covid-19 patients with chronic disease comorbidities from hospitalization (Bendelin *et al.*, 2020). On the other hand, the use of telemedicine in the treatment of chronic diseases makes it easier to control patient medication (Orozco-Beltran *et al.*, 2017). Additionally, telemedicine is beneficial in reducing the number of visits to the hospital and arrivals to the emergency department (Eccleston *et al.*, 2020). Telemedicine can support patient self-management starting from medication prescription, lifestyle modification, and patient emotional management effectively, which then improve the quality of patient outcomes (Hanlon *et al.*, 2017). Through telemedicine, patients with chronic diseases can be avoided from Covid-19 infection that are at risk of increasing the risk of patient death (Guan *et al.*, 2020).

Research evaluating the use of telemedicine in Indonesia is still rarely done. In the current literature review, we included eight studies between 2017 and 2021 (Konduri *et al.*, 2017; Amir *et al.*, 2019, 2021; Aisyah *et al.*, 2020; Garg *et al.*, 2020; Mappangara *et al.*, 2020; Wijaya, Paramitha and Pinzon, 2020; Rinawan *et al.*, 2021). Of the total, three studies evaluating the use of telemedicine in the cardiology field (Amir *et al.*, 2019, 2021; Mappangara *et al.*, 2020) four studies in public health (Konduri *et al.*, 2017; Aisyah *et al.*, 2020; Garg *et al.*, 2020; Rinawan *et al.*, 2021) and one study from the field of neurology (Wijaya, Paramitha and Pinzon, 2020). All research was a prospective cohort study. Eligible studies discovered that telemedicine helps in diagnosing and treating patients effectively and efficiently.

Future prospect of telemedicine in Indonesia

Although telemedicine can improve the quality of medical practice during a pandemic, the use of telemedicine has several challenges, namely related to human resources, infrastructure and ethical regulations (Tedeschi, 2020). Doctors and health policymakers are currently still paying less attention to the use of telemedicine to integrate it into the national health system (Omboni, 2020). Due to the need for doctors to master new and complicated consultation techniques, the use of telemedicine by medical professionals is still restricted during the present Covid-19 epidemic (Smith *et al.*, 2020). In addition, health policy-making factors regarding telemedicine depend on the geographical conditions of the application of the technology, which limit

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

the use of telemedicine in urban areas due to the ease of access to health care facilities compared to remote locations (Smith *et al.*, 2020). The majority of existing telemedicine policies use telemedicine in rural and remote areas to make it easier for rural communities to consult doctors without travelling long distances. In the context of Covid-19, telemedicine is needed in dense populations that have a high risk of transmission, such as in urban areas. Therefore, promotions related to the use of telemedicine can be a priority in pandemic conditions to minimize the risk of transmission through person-to-person contact (Kichloo *et al.*, 2020).

Procurement of telemedicine facilities requires infrastructure that can support telemedicine applications. However, it is undoubted that a significant challenge in developing countries is the basic infrastructure such as electricity, electronic hardware, communication equipment, and software applications to support telemedicine activities (Combi, Pozzani and Pozzi, 2016). Deloitte has suggested a framework called “Five Yearly Developmental Goal” in which infrastructure, data storage, and eHealth actualization (Smart hospital using Integrated Management Information System) are comprehensively planned (Deloitte 2019). In addition, the financial difficulties of using telemedicine in medical procedures are due to the unclear return on investment due to unclear income measures and complex insurance reimbursement (Iribarren *et al.*, 2017). The financial challenges associated with procurement of telemedicine infrastructure hinder in the necessary technologies development and thus limit the application of telemedicine in medical practice (Kim and Zuckerman, 2019).

The accessibility of medical records via telemedicine during doctor-patient consultations is one of the problems in promoting the field of telemedicine (Orozco-Beltran *et al.*, 2017; Bendelin *et al.*, 2020). Privacy of data and medical records is a concern when using telemedicine in every practice of doctors. This condition results from telemedicine's use of unregulated medicine. Problems in ethical aspects related to patient information for treatment can cost a lot of money in solving these problems (Tedeschi, 2020). To address these moral dilemmas, medical professionals must inform patients about the restrictions placed on their use of telemedicine so that they can consent to it or decline. To guarantee patients of the confidentiality of patient data and information, clinicians using telemedicine must also follow specific rules and laws (Ventura, Gibson and Collier, 2020). Figure 1 depicts an overview of development of telemedicine in Indonesia.

Conclusion

When telehealth is successfully implemented in Indonesia, it will benefit both the developer and the consumer in many aspects. Despite the benefits, the challenge of implementing and developing a comprehensive eHealth environment in Indonesia might be seen as tremendous, given that the country is currently developing its infrastructure. This literature review provides the government’s and private companies’ effort in developing and strengthening the telemedicine infrastructure in the country. Also, promising future of telemedicine should be balanced with some ethical and human resources issue.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

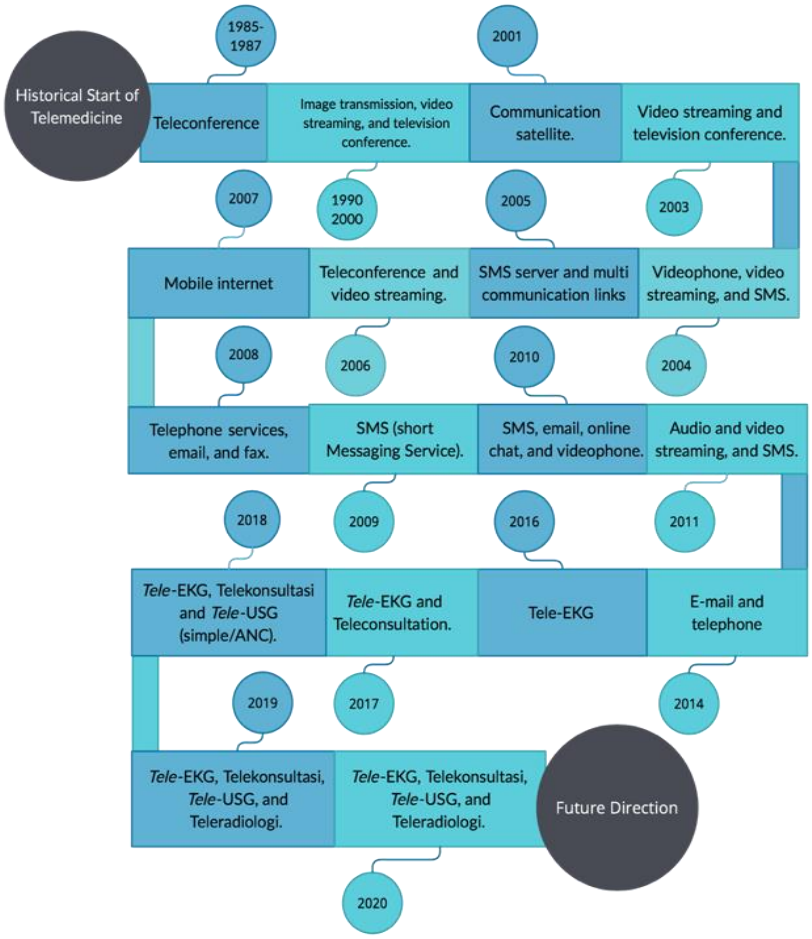

Figure 1. An overview of development of telemedicine in Indonesia.

Abbreviations

Covid-19: Coronavirus Disease 2019; 3G: Third generation; DTPK: *Daerah Tertinggal Perbatasan dan Kepulauan*; *Posyandu*: Pos Pelayanan Terpadu; *Puskesmas*: Pusat Kesehatan Masyarakat; TeleEKG: Tele-Electrocardiogram; TeleUSG; Tele-Ultrasonography; INA-CBG; Indonesia Case Base Group; JKN: Jaminan Kesehatan Nasional; BPJS; *Badan Penyelenggara Jaminan Sosial*; SMS; Short Message System; PC; Personal computer; ICT; Information and Communications Technology; ITB; *Institut Teknologi Bandung*; UNJANI; *Universitas Achmad Yani*; PARTNERS; Pan Asia-Pacific Region Telecommunication Network for Tests and Research by Satellite; NOS; Newcastle-Ottawa Scale; JBI; Joanna Briggs Institute; WHO; World Health Organization

Declarations

Ethics Approval and Consent Participant

Not applicable

Conflict of Interest

The authors declare that there is no significant conflict of interest that might have affected the performance.

Availability of Data and Materials

Data and material research are available upon reasonable requests. For more information, contact the corresponding author (JH).

Authors' Contribution

The study was developed and designed by GH, LR, and JH. All authors contributed in

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.261-272

writing this manuscript equally. The data was collected and extracted by GH, LR, and JH. The final manuscript was read and approved by the authors.

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Commentary Article

Indonesian Journal of Health Administration
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10.20473/jaki.v10i2.2022.273-279

ONLINE EDUCATION DURING THE CORONAVIRUS PANDEMIC: ADVANTAGES AND DISADVANTAGES IN HIGHER EDUCATION

Pendidikan Online Selama Pandemi Coronavirus: Keunggulan dan Kelemahannya di Pendidikan Tinggi

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Abstract

Everything is changing rapidly, and the development of technology and information has changed significantly in the last few decades. Education, like other aspects of society, needs to change and adapt appropriately. Online teaching and learning is a new approach for the authors to use information technology via distance learning programs, especially in the way relationships and interactions altered between students and teachers or instructors when the Coronavirus disease (Covid-19) pandemic occurred. Mahidol University responded to the situation rapidly and announced that academics could use students' online teaching free of charge. The research aim is to identify the advantages and disadvantages encountered while applying the online method of instruction. Implementation, the online program has made teaching possible, but it has disadvantages that may decrease the quality of education. Nevertheless, it replaced traditional teaching methods by utilizing the web-based program, Webex Meetings, across the whole university. Conclusion, this new approach has changed and opened horizons earlier than the authors thought and far beyond our beliefs concerning traditional education methods for future generations.

Keywords: Covid-19, distance learning, Mahidol University, online, Webex

Abstrak

Semuanya berubah dengan cepat dan perkembangan teknologi dan informasi telah berubah secara signifikan dalam beberapa dekade terakhir. Pendidikan, seperti aspek masyarakat lainnya, perlu berubah dan beradaptasi dengan tepat. Pengajaran dan pembelajaran online adalah pendekatan baru bagi penulis untuk menggunakan teknologi informasi melalui program pembelajaran jarak jauh, terutama cara mengubah hubungan dan interaksi antara siswa dan guru atau instruktur ketika pandemi penyakit Coronavirus (Covid-19) terjadi. Universitas Mahidol menanggapi situasi dengan cepat dan mengumumkan bahwa akademisi dapat menggunakan pengajaran online siswa secara gratis. Tujuan penelitian ini untuk mengidentifikasi keuntungan dan Kerugian yang dihadapi saat menerapkan metode pengajaran online. Implementasi, program online telah memungkinkan pengajaran tetapi memiliki kelemahan yang dapat menurunkan kualitas Pendidikan. Namun demikian, itu digunakan untuk menggantikan metode pengajaran tradisional dengan memanfaatkan program berbasis web, Webex Meetings, di seluruh universitas. Kesimpulan, pendekatan baru initelah mengubah dan membuka cakrawala lebih awal dari yang penulis pikirkan dan jauh melampaui keyakinan kita tentang metode Pendidikan tradisional untuk generasi mendatang.

***Kata kunci**: Covid-19, pembelajaran jarak jauh, Universitas Mahidol, online, Webex*

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Introduction

The past few years have shown the public that, during times of uncertainty, educational institutes need to show they can remain responsive and resourceful. Accordingly, all of them are required to find creative ways to maintain uninterrupted learning and studying. With many institutes and schools facing physical campus closures and the subsequent move to online learning due to the Coronavirus disease (COVID-19) situation, Mahidol University announced that academics should have greater access to online resources to facilitate distance learning (Mahaisavariya, 2020. The university believed that doing so would make it possible to keep coursework, teamwork, and student progress on track through home access for students, teachers, or instructors at no additional cost. Approaching online instructed course design for students during the emergency situation of the COVID-19 pandemic, teachers or instructors need to bear in mind at the beginning that this transition from the traditional classroom to online course delivery should drive student educational success, maintain their attention and boost their motivation as in the traditional classroom. However, it is always challenging to accomplish that.

Online teaching and learning usually mean students engaging with other students and teachers/ instructors or learning materials via an internet connection. At the moment, during this Coronavirus disease pandemic period, students can interact with teachers/ instructors and fellow students through webcams on the internet in conjunction with programs or applications like Zoom, Blackboard, Google Meeting, MS Teams, and Webex Meetings. Online teaching and learning or distance learning are increasingly becoming an alternative teaching tool in education, especially during social distancing when students and teachers/ instructors are spread far and wide in relation to the area where the course normally takes place. Contrary to a traditional classroom setting where students and teachers/ instructors interact in real time, in an online teaching and learning setting, the interface could be asynchronous or synchronous, depending on the software used. Since students and teachers/ instructors are separated physically, an agreement could be arranged. A synchronous program is in real-time and facilitates online access between teachers/instructors and students, and allows all participants to post chat communications to other students over the online program (Arkorful and Abaidoo, 2015). A synchronous program also has a function for video, which is a powerful way to engage students. As education shifts to online learning, it becomes even more essential to maintain the relationship between teachers/ instructors and students, which is vital for effective study. With regard to asynchronous programs, instead of sticking to a tight schedule, this type of virtual learning allows students to choose a time best suited for attending classes, with asynchronous classes, including e- mail, discussion boards, and podcasts. Some programs even allow the recording of teaching activities and interactions for later review by students.

Online teaching and learning could provide as good quality as a traditional classroom. However, students who study online need more interaction with teachers/ instructors or even among themselves. Research showed they are less likely to become engaged and high risk of dropping out from the course. Finding various forms of student interaction is critical (Greenhow and Galvin, 2020). How online teaching and learning or distance learning works effectively is measured by

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the amount of comfort that exists between students and teachers/ instructors. Prompt feedback and personal interest in student progress is a prerequisite from the instructor and, at the same time, a student is required to be pro- active in asking questions and raising concerns. Healthy dialogue and group discussions are the best ways to learn in a virtual classroom. In this case, a real-time program should be installed ahead of the schedule and used to replicate a simultaneous active classroom.

Implementation

The online teaching and learning environment is making a major contribution to educational requirements at this time by encouraging the general acceptance of the concept of knowledge as a vital element in social development and economic growth. Keeping pace with changes in technology and meeting the increasing demands of a knowledge-based culture in a country like Thailand will require a highly skilled and educated workforce capable of working collaboratively to find solutions to diverse economic, social and environmental problems.

The key to success in this situation is, in large part, continuing education, which means that online learning, with opportunities for active collaboration from students and university in this unprepared environment, will have an important role to play in meeting the challenges of the current situation and the future (Stansfield *et al*., 2004).

The authors did not have time to investigate how online teaching and learning or distance learning works, but it is vital for teachers/instructors and students to understand the basics of how an online course functions before getting involved in one. As mentioned above, there are many online programs available along with what it takes to plan, schedule and organize the virtual classrooms. However, we are familiar with teaching an online public health program so the authors' views may be particularly useful to other readers who are interested in teaching or learning in a public health aspect. Mahidol University has encouraged academics to use the Webex Meetings program on either personal computer or notebook desktop and mobile applications in tablet or smartphone. Academics at the Faculty of Public Health have used Webex Meetings since the university started the online program in March 2020 (Mahaisavariya, 2020).

Teaching and learning online have some things in common with the traditional classroom. Both have teachers/ instructors as facilitators who help and guide discussion among other students. Morgan (2016) mentioned some studies show online students slightly outperform their traditional classroom counterparts, but most evidence indicates that there is little difference in overall performance between the traditional and online classroom. Although there are also many other factors concerning personal teaching styles and preferences, this article can still help others to think about the virtual classroom during the Covid-19 pandemic period. Moreover, there are a few issues that come to mind for many academics who are not familiar with online teaching. How online teaching and learning or distance learning works efficiently is dependent upon how well the students and teachers/instructors use the available technology.

The Webex Meetings program has a synchronous approach and, therefore, students attend class at a scheduled time. The teacher or instructor, as host, can easily start the class and the class schedule is published in advance. The online classroom's meeting number is generated along with a password for prospective participants. Using the meeting number and

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password, students can access the classroom through the link provided and a pop up reminder is sent via e-mail to all students prior to class starting. Students and instructors can participate using audio, video or text-based chat. Anyone can post and share documents to the class for discussion, which is the best hassle-free practice for interaction among others. Everyone can access information related to course work in real time from his/her personal computer or other communication device, for example tablet or smartphone. Using Webex Meetings, the authors are the hosts and set up classroom schedules in advance. The hosts can amend the classroom to accommodate other students or participants. The class can be live (synchronous) or prerecorded (asynchronous, with other program applications), so students can watch in their own time (asynchronous) or as a combination of both. Students can watch or listen (with audio feature with Webex Meetings) the class again if they require further clarification or comprehension of the lesson.

Webex Meetings has several useful features, such as turning off your microphone to listen to key moments in the classroom. A student or teacher/ instructor can remove his/her own voice or background noises, which allows them to concentrate on listening to others, especially during important parts of the lesson. The host also has the ability to turn off all other participants' microphones and cameras. In addition, each participant can turn off their own camera if they want to leave the classroom for, say, a bathroom or rest break. The program allows up to 1,000 participants to join in the same online fewer functions than other programs, but it is quite secure.

Alternative web-based online programs used by other institutes in Thailand include Zoom, Blackboard, MS Teams, Echo, Skype and Google Meeting or Google Classroom. These programs have a few different functions, but most are the same and are free of charge within certain limitations. For example, Zoom allows free meetings or online classrooms up to a maximum duration of 40 minutes.

The authors found that users will encounter various advantages and disadvantages whilst using these online programs. These are highlighted in Tables 1 and 2.

The point about the way instructors cope with technology may be a drawback which could continue since they envision that technology for online program should be user friendly and sometimes it is not. Likewise, not all students are well-equipped with a robust personal computer set up with compatible software and microphone, headphone, speaker and video camera ready to engage in team assignments or online activities. Many computers or notebooks have these gadgets as part of their basic packages but not all do; some of them do not have these accessory features built in, do not have enough memory space in the hard disk and, in some cases, the software is not updated. Asking students to buy the accessories for the program to meet the needs can lead to further problems especially for old machines that do not have enough USB ports. When working on the Webex Meetings online program, best possible practice is to consider the existing technology that students have been bringing to the traditional classroom, mostly smartphone and tablet. Students can easily install and download the program on those tools they use daily.

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Table 1. Advantages of distance learning provided

Advantages
Reduces operational costs and other resources for both the university and instructor/academic. Reduces transportation period.
Self-tailored learning for student. Online learning allows student to learn at his/ her own pace, in one preferred medium and in a more comfortable environment. This is especially true for an asynchronous program.
The scheduled course makes students more responsible because when he/she enrolls for a particular course, the subjects or topics and time for study are already well-planned and disseminated. The student needs to be available during the specified period and has to be on time with other classmates and instructor, especially when there are presentations by other students.
Increased learner-centered approach. Learners can study tutorials or extra materials at their own pace and at the appropriate time for him/her. This is particularly important for students who are not able to follow the lecture, but have the capability to catch up and find missing information by studying at his/her own pace. Moreover, during discussion or chat not only participation in expressing their opinions and revealing their suggestions, but also daring to ask the questions may increase.

Table 2. Disadvantages of distance learning

Disadvantages
Requires rigorous time management and self-discipline from both students and instructors.
Some people feel uncomfortable due to online technology incompetency, especially senior instructors.
Technical problems, for example, the audio stability, the video continuity, and/or program update may interrupt and delay the lesson and may create confusion and frustration for the instructors and students, especially during the discussion and suggestions, including answering the questions.
Instructors and students may have difficulty using certain types of tools for online connections according to their internet providers and the uncommunicative areas. Mahidol University has provided free internet access for several months to all students during the COVID-19 pandemic periods. Resources for online learning and self-studying, for example, personal computer, notebook, tablets, or smartphone may be limited, especially in developing and underdeveloped countries.
Both students and instructors may lack motivation because they do not physically interact with each other in the online classroom.

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There are some limitations of online teaching such as teachers**/** instructors do not have any guidance when implementing the online course**.** They need evidence**-**based guidelines for constructively planning and conducting their classes**.** The evidence**-**based guidelines are usually derived from pertinent and empirical researches as pedagogical practices (Hew and Cheung, 2013).

It is also important to be aware that there are certain disadvantages to distance or online learning. During the pandemic, psychological issues can occur and learning online can make some students feel lonely or insecure without face-to-face contact with friends or other students (Swanson, 2015), no matter how often they communicate with others by smartphone. Some students are uncomfortable with their reading and writing skills and consequently may have difficulties with distance or online learning courses. However, the most frequent problems of learning online concern internet connection speed and a reliable electricity source.

Conclusion

Online or distance learning is not new but is very useful in providing quick and easy access for both teacher/ instructor and student. However, it is not yet ready to take over from the traditional university classroom because all participants are still learning to use the various functions and features appropriately and correctly. The most important challenge of using an online program is to provide a quality education to all students. The instructor needs to be proficient in using this new technology to provide a quality learning experience. It is important that the instructors can recognize the systematic equalities that could exist in education and that students are receiving it equally regardless of where they are. So long as a good internet connection and stable electricity source are available, university courses can be conducted in this innovative way during the lockdown period to the benefit of all university students.

Abbreviations

Covid-19: Coronavirus Disease of 2019; MS: Microsoft; USB: universal serial bus

Declarations

Ethics approval and consent participant

Not applicable.

Conflict of Interest

The authors declare that there is no significant conflict of interest that might have affected the performance.

Availability of data and materialss

Not applicable.

Authors' contribution

Synthesized (CS, PK, VP), drafted (VP), and revised the manuscript (VP, CS).

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FROM HOSPITAL READINESS TO PATIENT SAFETY: BUILDING LEADERSHIP CAPACITY FOR PATIENT SAFETY IN INDONESIA

Dari Kesiapsiagaan Rumah Sakit hingga Keselamatan Pasien: Membangun Kapasitas Kepemimpinan untuk Keselamatan Pasien di Indonesia

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Abstract

The COVID-19 pandemic has had an influence on patient safety and quality of care. A research undertaken in numerous countries found a deterioration in the quality of care during the pandemic. Leaders can improve patient safety in any circumstances, pandemic or not, by building a safety culture, reacting to patient and staff concerns, supporting safety activities, and tracking progress. Good leadership is essential to the success of patient safety programs and improving patient safety. Leaders must first establish strategic priorities and plans for culture and infrastructure that will aid in increasing patient safety. They must also actively inquire about patient safety situations and regularly examine patient safety data. Leaders must also collect data in order to foster a culture of patient safety. It is also critical to ensure that adequate infrastructure is available to support safety activities. Leaders have an important role in establishing the optimal methods for enhancing patient safety. Measures and improvement actions are rarely carried out in many nations; thus, leaders must ensure and encourage quality and safety development. Leadership commitment is the foundation for both pandemic and non-pandemic safety and quality improvement. Patient safety recommendations frameworks can help leaders improve patient safety in their organizations.

Keywords: leadership capacity, patient safety, pandemic

Abstrak

Pandemi Covid-19 berdampak pada keselamatan pasien dan kualitas perawatan. Penelitian yang dilakukan di berbagai negara menemukan penurunan kualitas perawatan selama pandemi. Seorang pemimpin dapat meningkatkan keselamatan pasien dalam keadaan apa pun, pandemi atau tidak, dengan membangun budaya keselamatan, menanggapi kekhawatiran pasien dan staf, mendukung aktivitas keselamatan, dan mengacu pada kemajuan. Kepemimpinan yang baik sangat penting untuk keberhasilan program keselamatan pasien dan meningkatkan keselamatan pasien. Pemimpin pertama-tama harus menetapkan prioritas dan rencana strategis untuk budaya dan infrastruktur yang akan membantu meningkatkan keselamatan pasien. Mereka juga harus secara aktif menanyakan tentang situasi keselamatan pasien dan secara teratur memeriksa data keselamatan pasien. Pimpinan juga harus mengumpulkan data untuk menumbuhkan budaya keselamatan pasien. Penting juga untuk memastikan bahwa infrastruktur yang memadai tersedia untuk mendukung kegiatan keselamatan. Pemimpin memiliki peran penting dalam membangun metode yang optimal untuk meningkatkan keselamatan pasien. Evaluasi dan tindakan perbaikan jarang dilakukan di banyak negara. Oleh karena itu, para pemimpin harus memastikan dan mendorong pengembangan kualitas dan keamanan. Komitmen kepemimpinan adalah dasar untuk peningkatan keselamatan dan kualitas pandemi dan non-pandemi. Kerangka kerja rekomendasi keselamatan pasien dapat membantu pemimpin meningkatkan keselamatan pasien di organisasi mereka.

Kata kunci: kapasitas kepemimpinan, keselamatan pasien, pandemi

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Introduction

Our recently published article (Dhamanti *et al.*, 2022) examined the impact of hospital preparedness on patient safety incidents during the COVID-19 pandemic in Indonesia using health worker perceptions. The results indicated that hospital ownership and accreditation improved hospital readiness to treat higher volumes and surge capacity, but not patient safety incidents, which continued to occur regardless of accreditation or ownership status. Health professionals frequently reported delays in treatments, errors in treatments, records, tests, patient identification, incorrect patient discharge information, and insufficient patient follow-up following diagnostic tests.

Although one could argue against using health worker perceptions due to problems with recall, bias, self-selection, etc., perceptions can reflect reality and serve as good surrogates for administrative data captured in patient charts. Another study demonstrated that people's judgments or perceptions tend to reflect their actual qualities (Wessels *et al.*, 2020). The local conditions to which employees are directly exposed are likely to influence their perceptions (Jepsen and Rousseau, 2022). Culture and climate research has demonstrated that frontline employees' perceptions are frequently accurate, and formal research tends to confirm this. The perceptions of employees were tied to their experiences (Peyton and Zigarmi, 2021).

Providing timely access to clinical care during pandemics is crucial; it is not sufficient to simply reduce the burden of unsafe care. In the United States, the Institute of Medicine provides six domains for quality (Institute of Medicine, 2001). Care needs to be safe, timely, effective, efficient, equitable and patient-centered. Furthermore, the Agency for Healthcare Research and Quality said there were five domains for clinical quality measures, including process, access, outcome, structure, and patient experience (Agency for Healthcare Research and Quality, 2018). During crisis phases of pandemics, care provision is frequently prioritized over other domains, and arguably for good reason. During a pandemic, is it possible to achieve a balance between these domains?

The findings of a study conducted in Italy indicated a decline in the quality of care, particularly during the pandemic (Golinelli *et al.*, 2022). Another European study demonstrates that the quality of healthcare services decreased during the pandemic (Tuczyńska *et al.*, 2022). There is also a decline in quality of care in developing nations. A study conducted in Brazil shows that, when compared to the previous year, the quality of care indicators showed a significant worsening during the COVID-19 pandemic (Foppa *et al.*, 2022). Developing countries face numerous obstacles, including a lack of healthcare workers, a rise in turnover, and an increase in ICU complexity due to changes in case-mix (Salluh, Lisboa and Bozza, 2020).

Discussion

Leaders can improve patient safety in any circumstances, pandemic or not, by building a safety culture, reacting to patient and staff concerns, supporting safety activities, and tracking progress (Agency for Healthcare Research and Quality, 2019). Leaders must manage and develop a wide range of innovative problem-solving solutions in order to keep their business functioning and patients safe and well-cared for (Kaul, Shah and El-Serag, 2020). Leader support is critical during the COVID-19 pandemic in order to implement an adequate crisis management approach (Dirani *et al.*, 2020). Leaders can also strengthen organizational resilience during

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the pandemic by learning from individual workers' anticipatory, coping, and recovery techniques (Rangachari and Woods, 2020). Patient safety leadership capacity aids in mitigating COVID-19 perceived threats. (Irshad, Majeed and Khattak, 2021).

What is required to make this happen? As a CEO/Executive, where do I begin? In this post, we suggest that good leadership is essential to the success of patient safety programs. A broad guideline is needed on the responsibilities of boards and senior management, as well as initiatives they may take to prioritize patient safety and institutionalize safety. The Institute of Healthcare Improvement (Botwinick, Bisognano and Haraden, 2006) has vast experience and success advising organizations on how to increase patient safety. The Institute for Patient Safety & Quality emphasizes three critical leadership characteristics for developing a patient safety culture in a local organization: communication, co-creation, and conflict resolution are all important. (Tan *et al*., 2019). Leaders frequently have strong intentions to prioritize patient safety, but they may be sidetracked by other pressing issues or a lack of understanding or a framework. In the table below, we present a high-level overview of the eight stages recommended by IHI for leaders to achieve high reliability and develop sustainable patient safety initiatives. We will next elaborate on the first and most important step (Step 1), which serves as the foundation for subsequent steps.

Step 1 : Address Strategic Priorities, Culture, and Infrastructure
Step 2 : Engage Key Stakeholders
Step 3 : Communicate and Build Awareness
Step 4 : Establish, Oversee and Communicate System-Level Aims
Step 5 : Track/Measure Performance Over Time, Strengthen Analysis
Step 6: Support Staff and Patients/Families Impacted by Medical Errors
Step 7: Align System-Wide Activities and Incentives
Step 8: Redesign Systems and Improve Reliability

Step 1 demands leaders to focus on patient safety strategic priorities, culture, and infrastructure, as well as: a) establish patient safety as a strategic priority; b) evaluate organizational culture; c) create a culture that promotes patient safety; d) address organizational infrastructure; and e) learn about patient safety and ways to enhance it.

Leaders, in our experience, must do "more" to position safety as a top strategic priority. Patient safety is frequently viewed as just another accreditation criterion for executives to check off, a passive or reactive strategy. Safety must be included not only in the strategy plan, but also prominently on the Board and Executive agendas. Leaders must spend time visiting employees and inquiring about safety concerns, incorporating patient safety into staff orientations, developing and reviewing safety data and dashboards, encouraging safety projects, and attempting to link executive remuneration to patient safety improvements. Patient safety objectives and goals must be clearly defined, along with action plans and accountability.

It is critical to assess organizational culture. Organizations must provide the right environment for safety procedures to thrive. To put it simply, a "just culture" is required for healthcare workers to feel comfortable and to "speak up." Creating a "fair culture" necessitates leadership dedication and patience. There are several surveys available to examine safety culture and, to develop the desired culture, organizations must use these data and take relevant measures.

One of the assumptions that CEOs and leaders frequently make is that

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appropriate infrastructure for patient safety exists. Organizational adjustments are required for safety activities to enable data gathering, analysis, reports, and decision-making. In the United States, Patient Safety Officers (PSO) often report to the CEO, COO, Chief Medical Officer, or other C-Suite executives. Other personnel, including such as epidemiologists, statisticians, human factors experts, patient safety trainers, and so on, must assist the PSO. A patient safety committee that meets on a regular basis and evaluates patient safety issues throughout the organization is necessary, but it is not sufficient because these are primarily advisory in nature. Some businesses have cross-functional "safety action teams" that meet monthly to discuss and resolve safety issues. To institutionalize patient safety, leaders should review their infrastructure and make proper budgetary allocations.

"Learning about patient safety methods and improvement" is the final step in laying the groundwork. Leaders must become familiar with patient safety and process improvement literature. Several resources are accessible, including those from the IHI and AHRQ, among others. It is critical to understand patient safety definitions and improvement approaches in order to drive change. Leaders must also be skilled at implementing change, and a review of various change management frameworks may be beneficial.

Learning about patient safety measures and improvement at the hospital level is barely implemented in many countries. As a result, leaders must encourage and support the everyday implementation of safety and quality improvement techniques at hospital level. There is still a lack of understanding that learning about patient safety measures and enhancing them is an investment for the organization. This is one of the areas that need to be prioritized in research and practice.

Conclusion

To conclude, a focus on quality and patient safety, whether during a pandemic or otherwise, begins with leaderships' commitment to making safety and quality a strategic priority and laying a strong foundation. Leaders can take several concrete steps to develop, implement and sustain these programs. The Institute of Health Care Improvement (IHI) framework is one approach that leaders can take to institutionalize patient safety.

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Commentary Article

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LESSON LEARNED FROM THE UNITED STATES: IMPROVING HEALTH COVERAGE IN A PRIMARY CARE

Pelajaran dari Amerika Serikat: Meningkatkan Jaminan Kesehatan di Layanan Primer

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Abstract

The universal health coverage in Indonesia is organized by *Badan Penyelenggara Jaminan Kesehatan* (BPJS), which gives health protection to the population as in medical insurance. This health coverage is essential to protect and maintain the quality of health in the Indonesian population. However, there were some burdens for universal health coverage, including the accessibility to National Health Insurance (JKN). Therefore, we may learn about improving health coverage in the United States, which is well known for Medicare and Medicaid, —the center of the US medical insurance. There are at least three main lessons to learn from medical insurance in the US, such as enrollment for medical insurance, sliding fee discount program, and cost analysis for fee-for-service in health care. Despite the difference in health system and population between the United States and Indonesia, these lessons could be tailored to reduce the burden to the universal health coverage in Indonesia.

Keywords: cost analysis, medical insurance, sliding fee discount, universal health coverage

Abstrak

Jaminan kesehatan semesta di Indonesia dikelola oleh Badan Penyelenggara Jaminan Kesehatan (BPJS) yang memberikan perlindungan kesehatan kepada masyarakat dalam bentuk asuransi kesehatan. Jaminan kesehatan merupakan hal esensial untuk melindungi dan menjaga kualitas kesehatan masyarakat Indonesia. Namun masih terdapat hambatan untuk pencapaian jaminan kesehatan semesta tersebut, seperti akses untuk mendapatkan Jaminan Kesehatan Nasional (JKN). Oleh karena itu, kita dapat belajar meningkatkan perlindungan kesehatan ini dari Amerika Serikat yang dikenal memiliki Medicare dan Medicaid, — asuransi kesehatan utama di Amerika Serikat. Terdapat tiga hal yang dapat kita pelajari dari asuransi kesehatan di Amerika Serikat, seperti kemudahan akses mendapatkan asuransi kesehatan, program discount biaya kesehatan, dan analisis biaya untuk fee-for-service dalam suatu fasilitas kesehatan. Walaupun terdapat perbedaan dalam sistem kesehatan dan kondisi masyarakat antara Amerika Serikat dan Indonesia, ketiga pelajaran ini dapat diadaptasikan untuk meminimalisasi hambatan dalam mencapai jaminan kesehatan semesta di Indonesia.

***Kata kunci**: analisis biaya, asuransi kesehatan, program discount biaya kesehatan, jaminan kesehatan semesta*

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Introduction

The universal health coverage in Indonesia is organized by Badan Penyelenggara Jaminan Kesehatan (BPJS) which gives a health protection to the population as medical insurances. This universal health coverage is called National Health Insurance, known as *Jaminan Kesehatan Nasional* (JKN).

JKN is a national health coverage for Indonesian people with a concept of social insurance and equity based in medical indication (Ministry of Health, 2014). The implementation of JKN is protecting the health of population through a medical insurance, including own paid premium (Non PBI) and premium paid by the government (PBI). The concept of JKN is adapted from the Managed Care which consists of family medicine, referral system, and prospective payment system. Although it adapts the Managed Care, but it lacks of cost control which resulted as deficit in the BPJS. Moreover, there are still some people have not enrolled yet to the JKN. Therefore, we need to learn from the United States (US) health insurance system to address those problems, including enrollment for medical insurance, sliding fee discount program, and cost analysis for fee-for-service in a primary health care.

Discussion

Enrollment for Medical Insurance

People who live in the United Stated should enroll for medical insurances to ensure they have protection for health issues. Having medical insurances are more beneficial than paying out-of-pocket regarding the expensive cost of medical services in the US (Finkler *et al.*, 2018; Zietlow *et al.*, 2018). Compared to Indonesia where majority of people still have burden to enroll into JKN, the enrollment for medical insurance is accessible to all residents in the US. They can enroll themselves online through a federal website called Health Insurance Marketplace (https://www.healthcare.gov). From this website, they could consider any healthcare plan that is available in their states and suits their needs. The information of monthly premium, deductible, co-pay, co-insurance, and out-of-pocket maximum are easily accessed from this website (Figure 1). It also gives comparation of benefits between each healthcare plan. Therefore, people can choose the healthcare plan that suit their needs and also enrolled themselves to the health insurance without hassle.

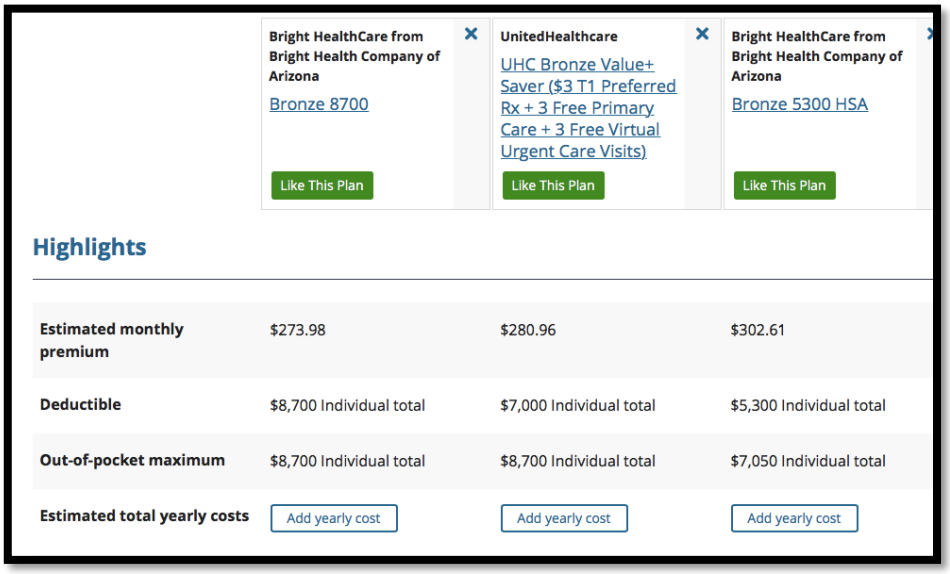

Figure 1. Comparison of Healthcare Plan from the Healthcare.gov (Department of Health, 2022)

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10.20473/jaki.v10i2.2022.286-292

Table1. Sliding Fee Scale Discount Program (Effective: July 1st, 2021)

Services	Medical Cost					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
Primary Care Medical Service						
Administrative fee – Primary Care Office Visit	$40	$45	$50	$55	Full price	Full price
Administrative fee – Primary Care Office Visit. with Procedures, Injection, and/or Labs (exclude specialty labs)	$70	$80	$90	$100	Full price	Full price
Obstetrics Prenatal Plan	$475	$525	$575	$600	Full price	Full price
Gynaecologist – In House (Colposcopy and LEEP)	$375	$425	$475	$500	Full price	Full price
Circumcision	$200	$250	$275	$325	Full price	Full price
Vasectomy	$375	$475	$575	$675	Full price	Full price
Dermatology Office Visit	$55	$60	$65	$70	Full price	Full price
Dermatology Office Visit with In-House Procedure	$110	$115	$120	$125	Full price	Full price
Podiatry General Visit	$55	$60	$65	$70	Full price	Full price
Podiatry General Visit with In-House Procedure	$110	$115	$120	$125	Full price	Full price
Family Planning Services (Title X Medicare)						
Administrative fee – Family Planning Office Visit (includes lab fees and supplies)	0	$30	$35	$45	$50	Full price
Laboratory Services						
Administrative fee – Labs and/or injections (excluding specialty labs)	$35	$40	$45	$50	Full price	Full price
Specialty care laboratory at cost	*See Sonora Quest Laboratories Fee Schedule*					
INR	$10	$10	$10	$10	Full price	Full price
TB Skin test	$30	$30	$30	$30	Full price	Full price
Immunization (including Flu)	*Immunization may be covered by Department of Health Services or may vary by insurance plan*					
Administration of immunization 1 only	$20	$20	$20	$20	Full price	Full price
Administration of immunization 2 only	$40	$40	$40	$40	Full price	Full price
Behavioral Health Services						
Counseling – Initial Assessment	$40	$45	$50	$55	Full price	Full price
Counseling – Re-Assessment Follow-up	$25	$30	$35	$40	Full price	Full price
Counseling – Individual Intervention	$25	$30	$35	$40	Full price	Full price
Counseling – Group Intervention	$5	$7	$9	$11	Full price	Full price
Counseling – Family session with patient	$25	$30	$35	$40	Full price	Full price
Counseling – Family session without patient	$35	$40	$45	$50	Full price	Full price

Source: Bureau of Primary Health Care (2018)

Table 2. Federal Poverty Income (Annual Income)*

Family Size	Code 0 Under 100%	Code 1 101% to 125%	Code 2 126% to 150%	Code 3 151% to 200%	Code 4 201% to 250%	Code 5 Over 250%
1	13,590	13,591 - 16,591	16,592 - 19,592	19,592 - 25,500	25,501 - 31,150	31,151 and up
2	17,590	17,591 - 21,591	20,301 - 24,360	24,361 - 32,361	32,362 - 40,600	40,601 and up
3	21,590	21,591 - 26,591	25,526 - 30,630	30,631 - 40,840	40,841 - 50,050	50,051 and up
4	25,600	25,601 - 32,750	30,751 - 36,900	36,900 - 50,200	50,201 - 62,500	62,501 and up
5	29,600	29,601 - 37,975	35,976 - 43,170	43,171 - 57,560	57,561 - 71,950	71,951 and up
6	33,600	33,601 - 41,200	41,201 - 49,440	49,441 - 63,020	63,021 - 79,400	79,401 and up
7	37,600	37,601 - 46,425	46,426 - 55,710	55,711 - 71,280	71,281 - 89,850	89,851 and up
8**	41,600	41,601 - 51,650	51,651 - 61,980	61,981 - 79,640	79,641 - 99,300	99,301 and up

*Source: (Health and Human Services Department, 2022)
**For families/ households with more than 8 persons, add $4180 for each additional person.

Indonesian Journal of Health Administration
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p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v10i2.2022.286-292

Furthermore, people with income at or below 200% Family Poverty Level (FPL) will be assessed by the website whether they are eligible for the Federal Insurance Program, such as Medicare and Medicaid. If the annual family income is 200% lower than the Family Poverty Level, then this family is eligible for Medicare and Medicaid which depends on the condition of the family member (elderly, children, or disability). Lopez et. al (2020) assessing this classification of Medicare with literature review method which is resulted that there are variety of Medicare class regarding geographic adjustment, household expenditures, and disproportionate share hospital (Lopez *et al.*, 2020).

Sliding Fee Scale Discount Program

One of the issues for low-income and uninsured population in the US was the financial barrier to access health services. Sliding fee discount program (SFDP) is intended to minimize this barrier for those population whose income at or below 200% Family Poverty Level (Bureau of Primary Health Care, 2018). This sliding fee discount program has been applied to all patients for all in-scope services provided in a primary health care (Bustamante and Felix-Beltran, 2020).

Regarding the SFDP program, there are 4 discount pay classes based on income and family size, —as defined by the Governing Board in the primary health care. The SFDP were classified into Code 0 (100% FPL and below), Code 1 (101-125% FPL), Code 2 (126-150% FPL), Code 3 (151-200% FPL), Code 4 (200-250% FPL), and Code 5 (above 250% FPL) (Table 2). These codes represented how much the discount rate to pay for medical services (Table 1). For examples, the charge on primary care office visit in Code 0 was $35, while in Code 1 was $40, Code 2 is $45, Code 3 was $50, Code 4 and Code 5 paid a full service. This charge was gradient based on the income class which has been reviewed by the Governing Board before it is declared to patients (Shank and Riley, 2020).

From the Table 2, it is shown that a family size of 1 with annual income under 100% FPL is defined as Code 0. Therefore when this person has a medical service, he/she would only pay $35 instead of $150 for one visit (Bureau of Primary Health Care, 2018). Moreover, this person might still have a chance to enroll in a health insurance plan. Once this person is enrolled to a health insurance, the $35 cost is reimbursed to him/her (Bustamante and Felix-Beltran, 2020). Regarding this situation, SFDP is valuable to minimize burden to access health care for the low-income or uninsured population (Shank and Riley, 2020).

Cost Analysis

To have an accurate fee-for-service for the given medical services, the Bureau of Primary Health Care gives guidance for the primary care to analyze the medical cost, which is called a Physician Fee Schedule. Physician Fee Schedule (PFS) is a list of fee-for-services given by a physician based on the medical service in a health care (Centers for Medicare and Medicaid Services, 2021, 2022). This PFS shows the payment rate for each individual services given by a health care based which might different between one health care to another. Different location of health care might use more expensive resources, therefore the medical cost should first be analyzed to get a valid and reasonable rate (Finkler *et al.*, 2018; Centers for Medicare and Medicaid Services, 2022). Furthermore, this PFS could minimize the risk of deficit in the financial balance of a health care.

The payment rate is calculated by multiplying each Relative Value Unit (RVU) with each Geographic Practice Cost Index (GPCI). Relative Value Unit (RVU) is a relative unit of time, skill, training and intensity required for a physician to provide medical service (Centers for Medicare and Medicaid Services, 2021). It is designed by the Centers for Medicare and Medicaid (CMS) to compare the weight of services and procedures. RVU consists of work RVU, overhead RVU and malpractice RVU (Centers for Medicare and Medicaid Services, 2018, 2021). Work RVU is the relative time and intensity associated with

Indonesian Journal of Health Administration
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10.20473/jaki.v10i2.2022.286-292

providing a Medicare service. Overhead RVU represents the costs to maintain a medical practice, including staff cost, renting of buildings, buying supplies and equipment. Malpractice RVU defines the cost of malpractice insurance (Centers for Medicare and Medicaid Services, 2018, 2021). Malpractice RVU is a safety net if the given medical services will bring any malpractice issues in the future. In addition, Geographic Practice Cost Index (GPCI) determines the allowable payment amount for medical services which is adjusted by different rates in wages and overhead costs across a geographic region in the US. GPCI is calculated based on the location of a health care (Centers for Medicare and Medicaid Services, 2021).

Before calculating the PFS, we should classified all medical services based on their Current Procedural Terminology (CPT) codes. Number of encounters and current charges are defined by CPT codes. Current Procedural Terminology (CPT) code is a medical code used to report medical, surgical, and diagnostic procedures and services to entities such as physicians, health insurance providers, and accreditation organizations (Centers for Medicare and Medicaid Services, 2022). After listing all CPT codes in the primary care setting, we calculated the annual expenses which include direct and indirect costs.

After we have the CPT code, we multiplied each RVU (work RVU, overhead RVU and malpractice RVU) with the Geographic Practice Cost Index (GPCI) to get adjusted RVU (Centers for Medicare and Medicaid Services, 2018). Each of these adjusted RVUs were summed up to get the RVU per CPT codes.

Any encounters for each medical service are multiplied by the RVU per CPT code to get the Total RVU. In addition, the annual expenses are divided by the total RVU to get the Average Cost per RVU. Finally, the fees for every service was calculated from the RVU per CPT codes multiplied by the Average Cost per RVU. The final calculation of fees was compared with the 50th and 75th percentiles of the Usual, Reasonable, and Customary (UCR) Medical Fees posted by the PMIC (Practice Management Corporation). The calculation of PFS should not too high or too low from the usual medical fees in similar location (Anagnostopoulou and Stavropoulou, 2021) . The reasonable costs were posted as the Physician Fee Schedule.

To claim reimbursement for the government insurance program, such as Medicare services, the charge of service is taken from the Physician Fee Schedule (Eltorai *et al.*, 2018). Every claim was reported as G-code, including G0466 for a new medical visit, G0467 for an established medical visit, G0468 for an Initial Preventive Physical Exams and Annual Wellness Visits, G0469 for a new behavioral health visit and G0470 for an established behavioral health visit (Centers for Medicare and Medicaid Services, 2022). G-codes are a set of specific payment code used to claim reimbursement from Medicare (Centers for Medicare and Medicaid Services, 2021, 2022). Referring the reimbursement charge to PFS could minimize the risk of claim refusal by the government, as in Medicare program.

In conclusion, cost analysis is a valuable tool to maximize payments from insurance providers and to review managed care contracts to determine if payments are fair and reasonable (Nolan *et al.*, 2014; Finkler *et al.*, 2018).

Learning from three main lessons in the US medical insurance, Indonesia can adapt those lessons to the National Health Insurance (JKN). Regarding the digitalization in Healthcare (Healthcare 4.0) nowadays, the benefits and health plan of each class in JKN can be informed in the JKN mobile application. Therefore, those people who pay the insurance premium by themselves (Non PBI) can consider which classes should be chosen. For example, the middle-income people can choose the first class of JKN if they agree with the health plan although their annual income are more suitable to the second class. Moreover, the suitable health plan should be synchronized with the tax system, therefore the low-income people will be automatically paid by the government (PBI) without administration nuisance.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v10i2.2022.286-292

There is another way to give health protection to those uninsured people, especially low-income population. The low-income people sometimes abandon their symptoms and do not immediately seek health care because they could not afford medical cost. These uninsured people can be offered with Sliding Fee Scale Discount program before they enroll to the JKN. Paying for medical care with a discount rate is more affordable than paying for medical care on a regular fare. Moreover, once these people are eligible to enroll for JKN, the prior payment they made can be reimbursed. Therefore, the health facilities have a safety net from the discount rate payment which can be claimed as soon as the people get insured. This sliding fee scale discount program gives benefits to both the uninsured patient and healthcare facilities.

Moreover, one issue of fee-for-service payment from BPJS to the hospital is unclaimed treatment and procedures. Sometimes the cost of medical care which is claimed by the hospital could not be verified by BPJS. If the medical cost is assessed as too expensive than the budget, then the BPJS would not verify the claim. This will bring a deficit to the hospital. Therefore, the medical cost should first do a Cost Analysis to have a reasonable list of prices regarding variation in types of physicians (primary care or specialist), types of medicine, types of medical equipment, the operational cost (electricity, water, etc), and variety of location. Furthermore, the Cost Analysis also includes a safety net if the given medical services will bring any malpractice issues in the future.

Conclusion

Reducing barrier to universal health coverage can be approached from financial management in a health care. There are at least three main lessons to learn from the medical insurance in the US, such as enrollment for medical insurance, sliding fee discount program, and cost analysis for fee-for-service in a health care. We can learn from the US the importance of Sliding Fee Discount Program and Cost Analysis to minimize the burden for low-income and uninsured population to access health care. Furthermore, the enrollment for medical insurance is accessible for all population through a website. Despite the difference of health system and population between the United States and Indonesia, these lessons could be tailored for reducing burden to universal health coverage in Indonesia

Abbreviations

US: United States, FPL: Family Poverty Level, SFDP: Sliding Fee Discount Program, PFS: Physician Fee Schedule, RVU: Relative Value Unit (RVU), GPCI: Geographic Practice Cost Index, CMS: Centers for Medicare and Medicaid, CPT: Current Procedural Terminology, UCR: Usual, Reasonable, and Customary, PMIC: Practice Management Corporation.

Declarations

Ethics Approval and Consent Participant
Not applicable.

Conflict of Interest
The authors declare that there is no significant conflict of interest that might have affected the performance.

Availability of Data and Materialss
Not applicable.

Authors' Contribution
Synthesized (KTK, LGP, DCO), drafted (KTK, GPB), and revised the manuscript (KTK, DCO).

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Indonesian Journal of Health Administration
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