Overview of COVID-19 Surveillance in Amuntai Selatan Public Health Center

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ABSTRACT

The COVID-19 pandemic is occurring worldwide, including in rural and remote areas. Prevention and management of pandemics vary greatly depending on the region's characteristics. Therefore, it was necessary to analyze COVID-19 cases in rural areas to understand the pattern of COVID-19 spread. We used descriptive epidemiological research with a cross-sectional approach in Amuntai Selatan Public Health Center. We found that the most confirmed cases occurred in women, the productive age group who worked as public servants and underwent self-isolation while exposed. While most death cases occurred in men, 56-60 years old, working as public servants and hospitalized. Public Health Center needs to improve reporting records, especially in comorbid and confirmed patient contact data. The characteristics of COVID-19 that more often affect productive adults and workers should be focused on preventing COVID-19 in the future.

Keywords: COVID-19, remote areas, health care systems, surveillance

INTRODUCTION

The COVID-19 pandemic has been two years and is becoming an unprecedented global crisis.[1] Millions of people lost their lives or lost their jobs, causing adverse effects on the economies of developing countries.[2] COVID-19 creates unpredictable threats, especially economic and public health.[3] The threat is increasing mainly in rural areas. Incomplete health facilities, economic limitations, and geographical boundaries pose significant challenges to the handling of COVID-19 in the countryside.[4]

Public Health Center is a health care facility that handles COVID-19 confirmation patients without symptoms and mild symptoms.[5] Indonesian health facilities are separated into primary and secondary services due to the size and complexity of care.[6] Rural primary care facilities face particular threats due to difficult access and low public awareness.[4] The government needs to take careful steps in handling COVID-19 in rural primary service facilities, especially equipment and human resources.[7]

Public Health Center also records and reports surveillance systems in its work area. Surveillance is an essential part of the public health system.[8] Good surveillance can describe the condition of health resources (facilities, personal protective equipment, health workers) while predicting the resilience of health systems in the face of subsequent.[8,9] Surveillance is also a method of controlling infectious diseases by tracking exposed individuals and their clinical outcomes.[9]

Therefore, the Public Health Center is an essential source of data in COVID-19 epidemiological surveillance in Indonesia. Public health centers can give information on the availability or scarcity of critical resources such as health facilities, PPE, and health worker shortages. Data collected during the COVID-19 pandemic in 2020 and 2021 can describe the characteristics of the spread of COVID-19. This data can also evaluate the readiness of the facilities in the face of the next wave of pandemics.[8]

The Public Health Center has difficulty conducting data analysis to evaluate pandemic handling in its work area. Pandemics destroy countries with weak health systems due to health facilities and infrastructure inequality, including Indonesia.[7] Rural areas have low access to health and substandard care.[10]

There is limited data about the

characteristics of confirmed cases and deaths in rural areas of Indonesia. Existing cases are only recorded simply without in-depth analysis. Rapid transmission makes health facilities overwhelmed in the face of a surge in cases.[11] The characteristics of COVID-19 cases can facilitate the determination of prevention and countermeasure strategies in each region. Without adequate preventive measures or treatment, the transmission will continue in the community.[12]

Amuntai Selatan Subdistrict has a remote area, so research is needed to be done on the characteristics of COVID-19 cases in this area. Care at primary care facilities is a gateway into the national health system. The Public Health Center is also spearheading the testing, tracing, and treatment of most cases of COVID-19 so that Public Health Center data becomes an important part that describes conditions in its work area.[13,14]

Healthcare systems provide significant challenges in remote areas, especially during emergencies such as pandemics.[15] The COVID-19 pandemic has had a more significant impact on densely populated areas and social conditions as diverse as big cities. But the impact will be much worse if the pandemic hits remote and rural areas. First, populations in rural or remote areas have little access to health facilities; do not have health insurance; have little information and education about the pandemic, and have slower behavioral and nonpharmacological intervention policies. Second, access to testing and isolation facilities and systems for contact tracing has not developed in the area. Third, the 'stay at home policy' may not be the best approach for such areas because it can trigger more poverty and the risk of hunger—other strategies for ensuring social distancing need to be developed.[16]

Remote areas face significant challenges in handling COVID-19 due to a lack of facilities, geographical barriers, and lack of health personnel. Amuntai Selatan Public Health Center has a large and scattered area, thus depicting a portrait of the magnitude of the gap in 3T (Testing, Tracing, and Treatment) that occurs in remote areas. Furthermore, this data can evaluate improving surveillance in remote Indonesia.

Therefore, it was necessary to analyze COVID-19 cases in Amuntai Selatan Subdistrict to understand the pattern of COVID-19 spread in remote areas. The data collected can improve surveillance systems and case definitions to help understand COVID-19 transmission in rural areas.[17]

METHOD

We used descriptive research with a cross-sectional approach. This study was an epidemiological study. This study used primary data from the recording and reporting system of surveillance systems of the Amuntai Selatan Public Health Center. Data was taken from March 2020 to December 2021. The population of this study was the entire community living in the Amuntai Selatan sub-district by the Identity Card. The study sample was that all patients were confirmed positive for COVID-19 in the Amuntai Selatan subdistrict, including those domiciled outside the region but had Amuntai Selatan District ID cards. Humans or other living things are not used as test subjects in this study. There was no formal ethical review required or carried out. Data were processed using Microsoft Excel 2019 and grouped by gender, age, occupation and isolation place.

RESULT AND DISCUSSION

Amuntai Selatan District is the first area to find cases of COVID-19 in Hulu Sungai Utara Regency, namely on March 8, 2020. There were 437 confirmed positive cases with 17 deaths (3.89%). The peak of COVID-19 cases in the Amuntai Selatan sub-district was in August 2021, as cases increased nationally due to delta variants. The last COVID-19 case in 2021 was discovered in September (Figure 1).
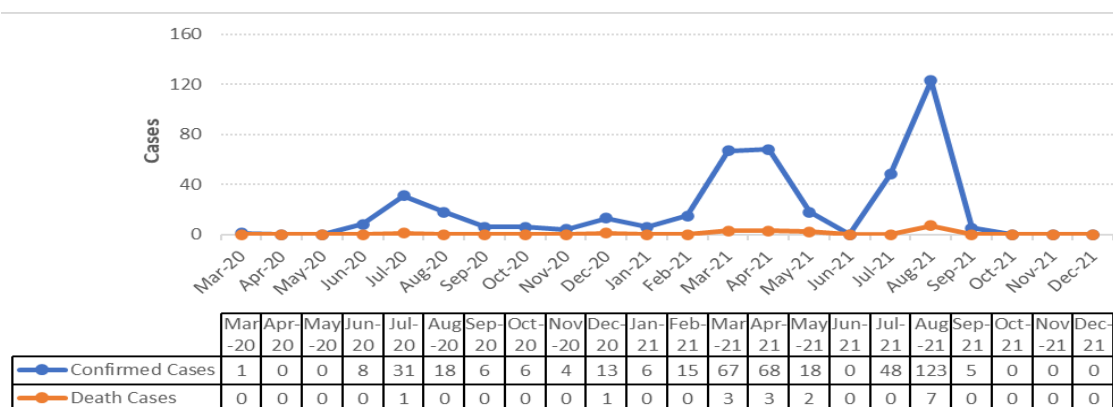

	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Confirmed Cases	1	0	0	8	31	18	6	6	4	13	6	15	67	68	18	0	48	123	5	0	0	0
Death Cases	0	0	0	0	1	0	0	0	0	1	0	0	3	3	2	0	0	7	0	0	0	0

Figure 1. Distribution of Confirmed and Death Cases Due to COVID-19 By Time

By gender, confirmed cases were more common in women (55.84%), while more deaths occurred in men (58.82%). In Amuntai Selatan, most cases occur in the productive age of 26-30, 31-35, and 36-40 (41.42%). Most deaths occur over 55 years, namely 56-60 (29.41%) (Table 1).

The most confirmed cases and deaths occur in public servants (table 1). Almost all confirmed patients were in isolation at home (88.79%), but deaths mainly occurred in hospitalized patients (82.35%) (Table 1).

Amuntai Selatan District is the first area to find cases of COVID-19 in Hulu Sungai Utara Regency. Became part of the Gowa cluster, the first wave of COVID-19, is supposed to be held in Gowa, South Sulawesi, on March 19-22, 2020. The government banned the event before it began, but about 8,000 people have gathered in Gowa. A few days later, several regions in Indonesia confirmed cases of COVID-19 related to this cluster.[18]

There were 437 confirmed positive cases of COVID-19, with 17 deaths at the end of 2021. The high number of COVID-19 cases in South Kalimantan Province could be due to several factors: population age, population density, population mobility, mobility type, type of community work, and COVID-19 patients' medical history (comorbidity), poor care, and access to health care facilities.[19,20] Current pandemics have variations that affect regional characteristics, access to health care, infrastructure, and preparedness between regions. This variation has a significant impact on morbidity and mortality. These factors are essential for health policy, not only for the current pandemic but also for future health systems' readiness.[21]

The peak of COVID-19 cases in the Amuntai Selatan sub-district was in August 2021, as cases increased nationally due to delta variants. The last COVID-19 case in 2021 was discovered in September 2021. The world's third wave of COVID-19 is a complete disaster, especially given the widespread appearance of delta variants. After two months of sweeping India, the delta variant caused an escalating crisis in Indonesia. The deceased are buried in government-run cemeteries in Indonesia, and the sight from the air is terrible. Civilian volunteer teams picked up patients who died while in isolation at home.[22,23]

At the beginning of the COVID-19 pandemic, Amuntai Selatan Subdistrict experienced obstacles in PCR examination, so many cases may not be detected. Over time, PCR Services opened in Hulu Sungai Utara Regency to facilitate early detection or diagnosis.[24] Although the nasopharyngeal swab is the definitive test by WHO recommendations, Indonesia makes various adjustments as PCR queues increase in various regions.[25]

Hulu Sungai Utara is included in criterion B, so diagnosis and screening using Rapid Antigen are needed. These changes lead to faster screening and diagnosis, resulting in more contacts and vulnerable populations being screened.[26] The Rapid Antigen Test reduces reliance on PCR, where the cost of PCR kits and technical expertise are high (25,26). Rapid diagnostic tests contribute to clinical and community health strategies for managing COVID-19 in rural areas.[29]

Table 1. Characteristics of Confirmed and Death Cases

	Confirmed Cases (n=437)	Deaths Cases (n=17)
Sex, n (%)		
Male	193 (44.16)	10 (58.82)
Female	244 (55.84)	7 (41.18)
Age, median (IQR), years	35 (26-46)	58 (52.5-62.5)
Age range, n (%)		
0-5 years	5 (1.14)	0
06-10 years	10 (2.29)	0
11-15 years	16 (3.66)	0
16-20 years	30 (6.86)	0
21-25 years	45 (10.3)	0
26-30 years	63 (14.42)	0

	Confirmed Cases (n=437)	Deaths Cases (n=17)
Age range, n (%)		
31-35 years	57 (13.04)	1 (5.88)
36-40 years	61 (13.96)	0
41-45 years	35 (8.01)	2 (11.76)
46-50 years	27 (6.18)	1 (5.88)
51-55 years	34 (7.78)	1 (5.88)
56-60 years	30 (6.86)	5 (29.41)
61-65 years	13 (2.97)	4 (23.53)
66-70 years	7 (1.6)	1 (5.88)
>70 years	4 (0.92)	2 (11.76)
Occupation, n (%)		
Public Servant	125 (28.60)	6 (35.29)
Private Sector	83 (18.99)	5 (29.41)
Health Workers	79 (18.08)	0
Students	73 (16.70)	0
Housewife	62 (14.19)	4 (23.53)
Not Working	15 (3.43)	2 (11.76)
Isolation Place, n (%)		
Self Isolation	388 (88.79)	3 (17.65)
Quarantine Center	24 (5.49)	0
Hospital	24 (5.49)	14 (82.35)
COVID-19 Referal Hospital	1 (0.23)	0

The first wave of COVID-19 in the Amuntai Selatan sub-district was from March 2020 to June 2021. The highest peak of it was found in April 2021. During the first wave, screening, diagnosis, and contact tracking use PCR, so maybe there are still many cases under detected.[30,31] The second wave of COVID-19 started from June 2021 to October 2021 and peaked in August. At this time, the use of Rapid Antigen became an essential point in tracing. The highest number of confirmed cases during the pandemic was in August 2021 (123 cases). Therefore, it was concluded that rapid tests had improved the tracing team's screening capabilities.[32]

The number of deaths in the Amuntai Selatan district amounted to 17 people. The highest peak of first wave deaths in March and April 2021 amounted to 3 people each, while the second wave deaths peaked in August 2021 at seven deaths. If reviewed based on gender, the Amuntai Selatan district noted that women are more infected with COVID-19 than men. In the other studies, men are more vulnerable to COVID-19 infection than women because of their mobility. Men also tend to have high mortality.[33]

Most patients confirmed positive for COVID-19 are productive age adults (26-30 years, 31-35 years, and 36-40 years). A study stated that most patients are aged 31-45 years, and the lowest population is 0-5 years. Research in Indonesia found COVID-19 more common in patients of productive age (ages 31-59) at 57.5%; most deaths were recorded in people aged > 60 years (43.6%).[34]

The risk of exposure to a person infected with SARS-CoV-2 is affected by age. Frequent levels of exposure are caused by the productive age group's high mobility combined with the lack of implementation of health protocols outside of health institutions. Because kids have not gone through the entire face-to-face learning process in school, COVID-19 cases affect fewer children. Furthermore, asymptomatic COVID-19 causes fewer surveillance systems to be detected in children. Meanwhile, because the elderly are less likely to be outside or travel, their risk of exposure is lower.[34]

Most COVID-19 confirmation cases are public servants and health workers. In addition, there were many positive confirmation incidents on public service officers in the Amuntai Selatan region. Public servants are at risk of exposure to SARS-CoV2 because they are often unable to keep their distance in performing service tasks.[30] Health workers are also an at-risk population due to a large amount of exposure.[35]

All positive confirmation patients underwent isolation following each individual's guidelines and severity. Most patients undergo self-isolation in their residences because they do not show symptoms or mild symptoms at the doctor's examination. However, at the pandemic's peak, there were long queues to get treatment at the COVID-19 Referral Hospital. This event resulted in the discovery of severe COVID-19 patients who underwent self-isolation at home while waiting for hospital availability.[36]

There are several limitations in handling COVID-19 in the Public Health Center, including the data, contact tracing, human resources, and geography. The search results of the surveillance data of the Amuntai Selatan Public Health Center revealed incomplete data. Comorbidities and details of therapy while in the hospital were not listed in the mortality data. Furthermore, data on self-isolation patients are inadequate, particularly in physical examination (daily temperature). Due to a paucity of medical technology, patients are solely followed via telephone interviews.

Incomplete data causes in-depth analysis of COVID-19 patient data cannot be done. This finding also evaluates the handling of COVID-19 next at the Amuntai Selatan Public Health Center. The government can conduct further surveillance system evaluations in remote areas for more effective pandemic handling.

Several studies on COVID-19 management in remote areas can be modeled: Active Surveillance, telemedicine, and telepharmaceuticals; the use of available communication media; and collaboration with policymakers. Various approaches must be made continuously to improve health systems in remote areas.

In Kenya, active surveillance with participatory methods (community-based surveillance activities) has shown promising results in remote rural areas, especially when combined with the One Health (Local Telemedicine System). This approach connects communities with local health institutions, generates trust, and helps improve surveillance networks.[37]

Telemedicine is beneficial to the health system for handling COVID-19, especially in monitoring, surveillance, and early detection, which has been very well focused in various countries.[15] Egyptians use Whatsapp and SMS for telepharmacy. Implementing hospital telepharmaceutical services reduces irrational medicines and improves clinical outcomes for COVID-19 patients in rural areas.[38]

Vietnam develops for their rural areas a 'Rapid Action Team' with the participation of all community stakeholders, including health workers (public and private health staff, retired health professionals), police, soldiers, teachers, community organizations, and communities. This grassroots health system mobilizes and prioritizes all its financial resources from the State budget and contributions from donors and non-governmental organizations to supply medical equipment and supplies. Information technology to improve reporting systems was also developed.[16]

Some lessons can be learned from the studies of these other countries. The main lesson is the importance of collaboration and engagement with local governments. It is imperative to engage with community leaders to develop COVID-19 preparedness plans in geographically isolated areas. Similarly, rapid community mapping and natural hazard risk assessment are essential before investing resources to develop facilities in geographically at-risk areas. Lastly, it is vital to simplify health care interventions in community settings. The development of standards for clinical procedures and protocols in an easy-to-understand language enables staff to understand the concepts of infection control and prevention quickly and communicate fluently with patients and their families regarding disease processes and public health measures.[39]

Contact tracing over large work areas is a challenge in dealing with the epidemic. Officers have trouble tracing most confirmed cases because they have a history of high mobility.[40] Many suspects refuse to be checked by health workers, and quarantine regulations are frequently disregarded. A policy that combines screening and restriction is the most successful. Screening lowers the risk of infection, while restrictions keep patients from resuming their normal lives too soon.[41] Surveillance teams that conduct daily monitoring and contact tracking are limited. The team was infected at the peak of the second wave, becoming an obstacle in performing tasks during the isolation period.[42]

We recommend that the surveillance side be improved in preparation for the next wave of

pandemics. In healthcare facilities, screening should be tightened. COVID-19 should be tested in all patients with ILI symptoms. To be examined, close contact is also required.[43] The utilization of digital-based surveillance is necessary to improve traditional surveillance. This technology aids in the improvement of checkpoints across the COVID-19 control.[9]

Officers must complete surveillance data and conduct data analysis regularly. If there is an increase in cases in specific populations or regions, officers must notify the local health service. The existence of COVID-19 is still widely denied by the public. This rejection hampered the Amuntai Selatan subdistrict's response to the pandemic. Increased cross-sector collaboration in contact tracking has now begun. Hopefully, this collaboration will improve the effectiveness of dealing with pandemics.[43]

Public Health Centers should also screen at-risk populations such as children in orphanages, boarding schools, dormitories, health workers, and public servants. We should focus on patients over 55 years, especially those with comorbidities. Public servants and health workers need to be screened periodically, especially officers who have comorbid. As a first-rate health care facility, the Public Health Center has limitations in handling COVID-19 confirmation patients. The Public Health Center needs to conduct a referral process for moderate and severe symptoms requiring intensive care. The referral process must be done to prevent death cases in patients undergoing self-isolation.

CONCLUSION

Amuntai Selatan district has experienced the COVID-19 pandemic since March 2020, with 437 cases with 17 deaths. So far, Amuntai Selatan has experienced two waves of COVID-19, with a peak of cases in August 2021. The last case in 2021 was discovered in September 2021. The most confirmed cases occurred in women, productive adults, working as civil servants and public servants, and undergoing self-isolation when exposed. While most death cases occurred in women over 41 years working as civil servants and hospitalized. Amuntai Selatan Public Health Center needs to improve reporting records, especially in comorbid and confirmed patient contact data. The characteristics of COVID-19 that more often affect productive adults and workers should focus on preventing COVID-19 in the future. Periodic screening in this group becomes vital in finding new clusters.

ACKNOWLEDGEMENT

REFERENCES

1. Hasan M, Ma'Abreh M, Al-Masri ARI. Attitude towards coronavirus pandemic "covid-19" and its relationship to optimism and pessimism among a sample of residents in Irbid. Univers J Public Heal. 2021;9(1):1–17.

2. Hazfiarini A, Akter S, Homer CSE, Zahroh RI, Bohren MA. 'We are going into battle without appropriate armour': A qualitative study of Indonesian midwives' experiences in providing maternity care during the COVID-19 pandemic. Women and Birth [Internet]. 2021;(October). Available from: https://doi.org/10.1016/j.wombi.2021.10.003

3. Mishra A, Basumallick S, Lu A, Chiu H, Shah MA, Shukla Y, et al. The healthier healthcare management models for COVID-19. J Infect Public Health [Internet]. 2021;14(7): 927–37. Available from: https://doi.org/10.1016/j.jiph.2021.05.014

4. Kerbage A, Matta M, Haddad S, Daniel P, Tawk L, Gemayel S, et al. Challenges facing COVID-19 in rural areas: An experience from Lebanon. Int J Disaster Risk Reduct [Internet]. 2021;53(July 2020):102013. Available from: https://doi.org/10.1016/j.ijdrr.2020.102013

5. Erlina Burhan, Agus Dwi Susanto, Sally A Nasution, Eka Ginanjar, Ceva Wicaksono Pitoyo, Adityo Susilo, Isman Firdaus, Anwar Santoso, Dafsah Arifa Juzar, Syafri Kamsul Arif, Navy G.H Lolong Wulung, Triya Damayanti, Wiwien Heru Wiyono, Prasenohadi, Afiatin, TC-19 I. Protokol Tatalaksana Covid-19. kemenkes RI. 2020;

6. Handayani PW, Dartanto T, Moeis FR, Pinem AA, Azzahro F, Hidayanto AN, et al. The regional and referral compliance of online healthcare systems by Indonesia National Health Insurance agency and health-seeking behavior in Indonesia. Heliyon [Internet]. 2021; 7(9): e08068. Available from: https://doi.org/10.1016/j.heliyon.2021.e08068

7. Smith C. The structural vulnerability of healthcare workers during COVID-19: Observations on the social context of risk and the equitable distribution of resources. Soc Sci Med [Internet]. 2020;258(June):113119. Available from: https://doi.org/10.1016/j.socscimed.2020.113119

8. Ibrahim NK. Epidemiologic surveillance for controlling Covid-19 pandemic: types, challenges and implications. J Infect Public Health [Internet]. 2020; 13(11): 1630–8. Available from: https://doi.org/10.1016/j.jiph.2020.07.019

9. Gong M, Liu L, Sun X, Yang Y, Wang S, Zhu H. Cloud-Based System for Effective Surveillance and Control of COVID-19: Useful Experiences from Hubei, China. J Med Internet Res. 2020; 22(4):1–9.

10. Aron JA, Bulteel AJB, Clayman KA, Cornett JA, Filtz K, Heneghan L, et al. Strategies for responding to the COVID-19 pandemic in a rural health system in New York state. Healthcare [Internet]. 2021;9(2):100508. Available from: https://doi.org/10.1016/j.hjdsi.2020.100508

11. Harapan H, Itoh N, Yufika A, Winardi W, Keam S, Te H, et al. Coronavirus disease 2019 (COVID-19): A literature review. J Infect Public Health [Internet]. 2020;13(5):667–73. Available from: https://doi.org/10.1016/j.jiph.2020.03.019

12. Russo AG, Faccini M, Bergamaschi W, Riussi A. Strategy to reduce adverse health outcomes in subjects highly vulnerable to COVID-19: results from a population-based study in Northern Italy. BMJ Open. 2021; 11(3): 1–10.

13. Kendzerska T, Zhu DT, Gershon AS, Edwards JD, Peixoto C, Robillard R, et al. The effects of the health system response to the covid-19 pandemic on chronic disease management: A narrative review. Risk Manag Healthc Policy. 2021; 14:575–84.

14. Brown J, Guru S, Williams K, Florentino R, Miner J, Cagir B. Rural Healthcare Center Preparation and Readiness Response to Threat of COVID-19. J Am Coll Surg [Internet]. 2020;230(6):1105–10. Available from: https://doi.org/10.1016/j.jamcollsurg.2020.04.006

15. Sampa MB, Hoque MR, Islam R, Nishikitani M, Nakashima N, Yokota F, et al. Redesigning portable health clinic platform as a remote healthcare system to tackle COVID-19 pandemic situation in unreached communities. Int J Environ Res Public Health. 2020;17(13):1–14.

16. Liu X, Zhang D, Sun T, Li X, Zhang H. Containing COVID-19 in rural and remote areas: Experiences from China. J Travel Med. 2020; 27(3): 1–4.

17. World Health Organization. Covid-19 Situation Report. World Heal Organ. 2020; 31(2): 61–6.

18. Rahvy AP, Ridlo IA. How Does Islamic Organizations Respond to COVID-19 in Indonesia？ A Case How Does Islamic Organizations Respond to COVID-19 in Indonesia？ A Case Study. Public Heal Prev Med Arch. 2021; 9(June): 11–6.

19. Pathak S, Jolly MK, Nandi D. Countries with high deaths due to flu and tuberculosis demonstrate lower COVID-19 mortality: roles of vaccinations. Hum Vaccines Immunother [Internet]. 2021; 17(9): 2851–62. Available from: https://doi.org/10.1080/21645515.2021.1908058

20. Amaliah ON, Sukmawaty Y, Susanti DS. Spatial autocorrelation analysis of Covid-19 cases in South Kalimantan, Indonesia. J Phys Conf Ser. 2021; 2106(1): 012005.

21. Li J, Huang DQ, Zou B, Yang H, Hui WZ, Rui F, et al. Epidemiology of COVID-19: A systematic review and meta-analysis of clinical characteristics, risk factors, and outcomes. J Med Virol. 2021 Mar 1;93(3): 1449–58.

22. Dyer O. Covid-19: Indonesia becomes Asia's new pandemic epicentre as delta variant spreads. BMJ. 2021;374(July):n1815.

23. El-Shafai W, Algarni AD, Banby GME, El-Samie FEA, Soliman NF. Classification framework for COVID-19 diagnosis based on deep cnn models. Intell Autom Soft Comput. 2022;31(3):1561–75.

24. Paulava V, Kamenska T, Terzi O, Borshch V. COVID-19 and maintaining public health within student community: Moral difficulties faced by students. Univers J Public Heal. 2021; 9(5): 240–52.

25. Al Qooz F, Behzad K, Louri N, Al-Khalifa K. Efficiency of National Taskforce for Combating the Coronavirus (COVID-19) Protocol using real-time PCR testing in health facilities over a period of 8-weeks. J Infect Public Health [Internet]. 2021; 14(8): 1045–50. Available from: https://doi.org/10.1016/j.jiph.2021.06.009

26. Menkes RI. Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/MENKES/446/2021 tentang Penggunaan Rapid Diagnostic Test Antigen dalam Pemeriksaan Corona Virus Disease 2019 (COVID-19). 2021.

27. Munne K, Bhanothu V, Mayekar A, Birje S, Bhor V, Patel V, et al. A retrospective analysis of COVID-19 diagnosis results obtained by rapid antigen tests and RT-PCR: Implications for disease management. Indian J Med Microbiol [Internet]. 2021; 39(4): 537–9. Available from: https://doi.org/10.1016/j.ijmmb.2021.05.00

6

28. Barreiro P, San-Román J, Carretero MDM, Candel FJ. Infection and infectivity: Utility of rapid antigen tests for the diagnosis of covid-19. Rev Esp Quimioter. 2021;34: 46–8.

29. Barrera-Avalos C, Luraschi R, Vallejos-Vidal E, Mella-Torres A, Hernández F, Figueroa M, et al. The Rapid Antigen Detection Test for SARS-CoV-2 Underestimates the Identification of COVID-19 Positive Cases and Compromises the Diagnosis of the SARS-CoV-2 (K417N/T, E484K, and N501Y) Variants. Front Public Heal. 2022; 9(January):1–8.

30. Sunandar H, Ramdhan DH. Preventing and controlling covid-19: A practical-basedreview in offshore workplace. Kesmas J Kesehat Masy Nas (National Public Heal Journal). 2021; 16(1): 97–101.

31. Vandenberg O, Martiny D, Rochas O, van Belkum A, Kozlakidis Z. Considerations for diagnostic COVID-19 tests. Nat Rev Microbiol [Internet]. 2021; 19(3): 171–83. Available from: http://dx.doi.org/10.1038/s41579-020-00461-z

32. Paramita S, Rahmadi A, Isnuwardana R, Nugroho RA. One-month progress of covid-19 cases in east kalimantan, indonesia. Open Access Maced J Med Sci. 2020; 8(T1): 45–50.

33. Surendra H, Elyazar IR, Djaafara BA, Ekawati LL, Saraswati K, Adrian V, et al. Clinical characteristics and mortality associated with COVID-19 in Jakarta, Indonesia: A hospital-based retrospective cohort study. Lancet Reg Heal - West Pacific [Internet]. 2021;9:100108. Available from: https://doi.org/10.1016/j.lanwpc.2021.100108

34. Hikmawati I, Setiyabudi R. Epidemiology of COVID-19 in Indonesia: common source and propagated source as a cause for outbreaks. J Infect Dev Ctries. 2021; 15(5): 646–52.

35. Pasani CF, Amelia R. Introduction of the integrative STEAM approach as a learning innovation in the COVID-19 pandemic in South Kalimantan. J Phys Conf Ser. 2021; 1832(1).

36. Susanto AD, Rozaliyani A, Prasetyo B, Agustin H, Baskoro H, Arifin AR, et al. Epidemiological and clinical features of covid-19 patients at national emergency hospital wisma atlet kemayoran, jakarta, Indonesia. Kesmas J Kesehat Masy Nas (National Public Heal Journal). 2021; 16(1): 11–6.

37. Worsley-Tonks KEL, Bender JB, Deem SL, Ferguson AW, Fèvre EM, Martins DJ, et al. Strengthening global health security by improving disease surveillance in remote rural areas of low-income and middle-income countries. Lancet Glob Heal. 2022; 10(4): 579–84.

38. Al Meslamani AZ, Kassem AB, El-Bassiouny NA, Ibrahim OM. An emergency plan for management of COVID-19 patients in rural areas. Int J Clin Pract [Internet]. 2021 Oct 5;75(10):9. Available from: https://doi.org/10.1111/ijcp.14563%0Awiley onlinelibrary.com/journal/ijcp

39. Jan R, Uddin M, Ullah I, Bibi M, Nawaz S, Rehmani M, et al. Developing COVID-19 emergency response centres in geographically challenged areas of Pakistan: A case study of the Aga Khan Development Network. Int J Health Plann Manage [Internet]. 2021 Nov 10; 36(6): 1990–7. Available from: https://onlinelibrary.wiley.com/doi/10.1002/hpm.3286

40. Rakhmadhani I, Yulida E, Fahrina, Jaelani AK. COVID-19 Vaccination Services: Legal Issues and Protection for Health Workers. In: Proceedings of the International Conference on Environmental and Energy Policy (ICEEP 2021) [Internet]. 2021. p. 110–4. Available from: https://www.atlantis-press.com/article/125961607

41. Kychko I, Kovalchuk S, Kopochynska Y, Glynyana O, Zub I. Implementation of the Health-Centrist Policy of the System Functioning of Healthcare and Labor Relations in the Context of the Development of Corporate Social Responsibility. Univers J Public Heal. 2021; 9(6): 367–77.

42. Rakhmadhani I, Yulida E, Fauzan A, Jaelani AK. Adverse events following immunization Post Moderna (mRNA-1273) booster vaccination after two primary doses of CoronaVac. Int J Health Sci (Qassim) [Internet]. 2022 Feb 6; 6(1): 160–73. Available from: https://sciencescholar.us/journal/index.php/ijhs/article/view/3626

43. Rakhmadhani I, Yulida E, Fahrina, Jaelani AK. COVID-19 Vaccine Hesitancy on Society and Related Legal Regulations. In: Proceedings of the International Conference on Environmental and Energy Policy (ICEEP 2021) [Internet]. 2021. p. 281–5. Available from: https://www.atlantis-

press.com/article/125961613.pdf