Pandemic-Resilient Sustainable Settlement Model in Makassar City

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Abstract

A pandemic is one of many types of disasters that must be considered in emergency response planning. Currently the Covid-19 pandemic is sweeping the world, including Indonesia, so there is increasing concern about urban settlements that have high density and vulnerability to Covid-19 because housing is one of the important factors during the pandemic. Based on this, it is deemed necessary to conduct a study on a sustainable urban settlement model that is resilient to pandemics so that it can facilitate and overcome pandemic cases that have or will occur. Resilient housing is a residential area or residence inhabited by people who are ready to face any threat, including Covid-19. The research location is a residential real estate located in the city of Makassar. The research method used is multiple regression, t test and f test. As a result, the most influential factor on the security of housing residents during the pandemic is supervision, while the most influential factor in increasing the transmission of Covid-19 is the vulnerability of socio-economic mix, both of which are the most dominant variables in increasing housing resilience to the pandemic. There are various control strategies with a pandemic resilient sustainable housing model, namely increasing supervision, limiting socio-economic mixing, principles of resilience and sustainability.

Keywords: Covid-19, Pandemics, Tough Housing

Introduction

Since the first case of Covid-19 in Indonesia, many things have been done in response to both the government and various parties in dealing with the virus on a global scale. The government's policy to deal with Covid-19 by reducing the intensity of leaving the house is something that is difficult to avoid. The consideration is space constraints and ineffective physical distance so that the spread of the virus is very likely to occur quickly (Snyder & Tormala, 2017). The Covid-19 pandemic is a significant risk. If not controlled, it can kill hundreds of millions of people with huge social and economic costs. If Covid-19 followed the pattern of previous pandemics, controlling it would require limited travel and months of physical interaction, giving rise to various health, social and economic problems.

To increase resilience, communities need effective responses including control of transmission, safe access, adequate housing and physical and mental support for isolated people, and affordability (Litman, 2020). Covid-19 is not the first pandemic facing the world community. According to Centers for Disease Control and Prevention atau CDC (2019), before the Covid-19 outbreak there were Asiatic Flu (1889), Spanish flu (1918), Asian flu (1959), SARS (2002), and MERS (2012).

According to Law Number 24 of 2007 concerning Disaster Management (2007) that pandemics are included in the category of non-natural disasters, namely disasters caused by non-natural events or series of events, which include technological failures, failed modernization, epidemics, and disease outbreaks. Currently, South Sulawesi (August 18, 2021)
is in fifth place in the provincial classification with the highest number of Covid-19 cases in Indonesia. In Makassar City, the spread of the Covid-19 virus is increasing every day. A sense of security is important for a person, because if someone feels threatened and afraid it will make a person behave in a closed manner, distrust other people and their environment, refuse to talk to strangers, are hesitant about new things, and hesitate when facing new situations.

The CPTED concept that is currently developing is more of an extension of the Defensible Space concept. In line with Jeffrey, Crowe stated that the CPTED concept is a concept similar to Defensible Space, namely by applying natural access control, natural surveillance and also territorial reinforcement. Crime Prevention through Environmental Design (CPTED) is defined as a technique to reduce or eliminate fear and crime by promoting the concept of environmental surveillance and the role of the community (Jacobs, 1961).

Transmission of SARS-CoV-2 can occur through direct contact, indirect contact, or close contact with an infected person through secretions such as saliva and respiratory tract secretions or respiratory droplets released when an infected person coughs, sneezes, talks, or sings. Person-to-person transmission can occur through direct contact or through droplets spread by coughing or sneezing from an infected person (Rothan & Byrareddy, 2020). Meanwhile, Vulnerability is a "loss" that can be expressed through damage and loss due to a certain hazard for a certain area and for a certain period. Based on mathematical calculations, risk is the product of hazard and vulnerability (Beck, 1992).

According to a Covid-19 spokesperson, settlements are the cluster with the highest spread of the Covid-19 virus. The reason is the negligence of residents of residential areas in complying with health protocols. The existence of the Covid-19 pandemic affects government policies in determining various efforts to be able to carry out activities both in various sectors, both economic, social and cultural by making regulations in accordance with health protocols by implementing IMR (adaptation of new habits) in the neighborhood. So that the results of this study are expected to contribute to housing providers to offer sustainable settlements that make residents feel resilient and the spread of Covid-19 can be overcome. The concept of urban resilience is a concept that has a correlation with the concept of sustainable development. This concept is not encouraged but implemented with the support of innovation, mitigation, and adaptation. Tough housing can prevent disease transmission in residential areas (Neiderud, 2015).

![Figure 1. Map of the spread of Covid-19 in Makassar City (source: Infocoronamakassar.go.id)](image)

In this study, the effect of the implementation of the crime prevention through environmental design variable on the perception of a sense of security for residents of housing during the
pandemic will be seen. Then will reveal the factors that cause the increase in transmission of Covid-19 during the pandemic. Finally, this research reveals how a sustainable settlement model is resilient to the pandemic.

Methods

Administratively, the research site was conducted on real estate housing in Makassar City. Research data were obtained from direct observations (observations), documentation, and questionnaires to the residents of the housing that was the location of the study. In this study using quantitative descriptive methods and variable measurement scales were carried out using the likert scale. This data uses multiple regression analysis, the T test and the F test to see the extent to which one variable has an effect on other variables. The sampling technique used in this study is part of the non-probability sampling technique, namely purposive sampling. The study population is residential residents spread across Makassar City with criteria of having been infected or there are other family members who live in the same house have contracted the Covid-19 virus and are self-isolating at home. Administered questionnaire Given to 30 respondents to see the validity of the questionnaire.

Figure 2. Map of Distribution of Respondents in Makassar City Housing (source: digitized results, 2021)

Crime Prevention through Environmental Design and A Sense Of Security During A Pandemic

Table 1. CPTED Assessment Criteria and Sense of Security (library synthesis, 2021)

<table>
<thead>
<tr>
<th>Concept</th>
<th>Variable</th>
<th>Dimension</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crime Prevention Through Environmental Design (CPTED)</strong></td>
<td>Access control (X1)</td>
<td>Access</td>
<td>1. Housing location</td>
</tr>
<tr>
<td>A technique to reduce or</td>
<td>This principle of regulating the entry and exit of visitors and commuters can reduce the likelihood of criminal activity (Zahm, 2007).</td>
<td>control</td>
<td>2. Access in and out of residential neighborhoods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Use of portals or fences in and out</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Checking, monitoring in and out of housing</td>
</tr>
</tbody>
</table>

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eliminate fear and crime by promoting the concept of supervision by the environment and the role of community communities (Jane Jacob, 1961)

<table>
<thead>
<tr>
<th>Surveillance (X2)</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| The principle of natural surveillance refers to the capacity of the environment to provide opportunities for people to supervise each other (Johnson 2014). | 1. The physical condition of the housing that is easy to monitor  
2. Additional facilities that assist with surveillance (Source: Munggaran, Bayu & Ardy Maulidy Navastara, 2018) |

<table>
<thead>
<tr>
<th>Territorial strengthening (X3)</th>
<th>Territorial strengthening</th>
</tr>
</thead>
</table>
| Distinguish private areas from public spaces to prevent violations by criminals. (Crowe & Fennelly, 2013) | 1. Means of joint activities between residents  
2. Interaction between residents  
3. A sense of belonging to the environment (Source: Munggaran, Bayu & Ardy Maulidy Navastara, 2018) |

<table>
<thead>
<tr>
<th>Perception</th>
<th>Perception of a sense of security (Y)</th>
</tr>
</thead>
</table>
| The feeling of security depends on the knowledge of the environment that requires awareness of where we are in space and time, therefore knowledge of the environment is important to evaluate the sense of security (Kaya & Kubat, 2007). | 1. In terms of access control  
2. In terms of supervision  
3. In terms of territorial strengthening (Source: Munggaran, Bayu & Ardy Maulidy Navastara, 2018) |

### Transmission Vulnerability and Increased Transmission of Covid-19


<table>
<thead>
<tr>
<th>Concept</th>
<th>Variable</th>
<th>Dimension</th>
<th>Indicators</th>
</tr>
</thead>
</table>
| Transmission Vulnerability | Vulnerability of Socioeconomic Mixing (X1) | The Vulnerability of Socioeconomic Mixing | 1. Mobility  
2. Household Structure  
3. Livelihood Imperatives |
| Includes vulnerabilities associated with socioeconomic mixing, housing and | The intensity of interaction and the movement or movement of human beings from one space to another. | | |
infrastructure, where conditions can drive increased transmission.  

Housing Vulnerabilities (X2)  
The place where the process of socialization takes place in an individual is introduced the norms and customs of customs that prevail in a society.  
Budiharjo (1998)

Housing Vulnerabilities 1. Density 2. Ventilation

Infrastructure Vulnerabilities (X3)  
The basic facilities or structures, equipment, installations built and that are needed for the functioning of the social system and the economic system of society (Grigg, 2000).


Increased Transmission  
Susceptibility to natural hazards refers to conditions determined by physical, social, economic, and environmental factors that increase people's susceptibility to danger  
Source: Bizimana (2015)

Increased Transmission (Y)  
Risk Factors are variables associated with an increase in a risk in this case a particular disease. The increase in transmission is due to how the virus spreads (WHO)

Source: Bizimana (2015)

Results and Discussion

Test Instrument Items

Hypothesis testing will not hit the target if the data used to test the hypothesis is unreliable data and does not describe exactly the measured concept (sunyoto, 2013).

Validity and reliability Tests

The validity test decision-making criterion for each question is the Corrected Item-Total Correlation value or the calculated r value must be above 0.3 (Sugiyono, 2016).

Table 3. Validity Test (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicators</th>
<th>Corrected Item-Total Correlation</th>
<th>Minimum r</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Control (X1)</td>
<td>X1.1</td>
<td>0.551</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X1.2</td>
<td>0.727</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X1.3</td>
<td>0.700</td>
<td>0.3</td>
<td>Valid</td>
</tr>
</tbody>
</table>
Reliability is a tool to measure a questionnaire which is an indicator of a variable or construct Imam (2011). In this study, reliability measurements were carried out using the cronbach’s alpha method, where the questionnaire was said to be reliable if the value of cronbach’s alpha > 0.6. A reliability test is performed against a valid question.

Table 4. Reliability Test (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicators</th>
<th>Corrected Item-Total Correlation</th>
<th>Minimum r</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerability of Socioeconomic Mixing (X1)</td>
<td>X1.1</td>
<td>0.633</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X1.2</td>
<td>0.543</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X1.3</td>
<td>0.646</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td>Housing Vulnerabilities (X2)</td>
<td>X2.1</td>
<td>0.544</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X2.2</td>
<td>0.544</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td>Infrastructure Vulnerabilities (X3)</td>
<td>X3.1</td>
<td>0.817</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X3.2</td>
<td>0.914</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>X3.3</td>
<td>0.864</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td>Increased Transmission (Y)</td>
<td>Y1</td>
<td>0.663</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>Y2</td>
<td>0.744</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>Y3</td>
<td>0.628</td>
<td>0.3</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>Y4</td>
<td>0.682</td>
<td>0.3</td>
<td>Valid</td>
</tr>
</tbody>
</table>
Crime Prevention Through Environmental Design and a Sense of Security during a Pandemic

Multiple Regression Analysis

This analysis used to calculate the magnitude of the effect of access control, surveillance, and territorial strengthening on the perception of security can be seen through the regression equation in the following table:

Table 5. Multiple Regression Analysis Results (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Type</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>1.968</td>
<td>0.533</td>
<td></td>
<td>3.694</td>
</tr>
<tr>
<td>Access Control</td>
<td>-0.435</td>
<td>0.180</td>
<td>-0.431</td>
<td>-2.424</td>
</tr>
<tr>
<td>Supervision</td>
<td>0.843</td>
<td>0.179</td>
<td>0.971</td>
<td>4.718</td>
</tr>
<tr>
<td>Territorial Strengthening</td>
<td>-0.008</td>
<td>0.188</td>
<td>-0.008</td>
<td>-0.041</td>
</tr>
</tbody>
</table>

a. Dependent Variables: Perception of security during a pandemic

Based on the table, the value of the access control coefficient (X1) is -0.435, supervision (X2) is 0.843 and territory strengthening (X3) is -0.008. Thus, the value of the calculation result of the regression analysis is formulated into the following equation:

\[ Y = 1.968 + (-0.435) X1 + 0.843 X2 + (-0.008) X3 \]

Multiple Regression Test (F Test)

Table 7. Multiple Regression Test (F Test) (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Type</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>13.697</td>
<td>3</td>
<td>4.566</td>
<td>11.352</td>
<td>&lt;.001b</td>
</tr>
<tr>
<td>Residual</td>
<td>10.457</td>
<td>26</td>
<td>0.402</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24.155</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variables: Perception of security during a pandemic
b. Predictors: (Constant), territorial strengthening, access control, supervision

Based on the results of data processing, the significance value is smaller than 0.05 (<0.001 < 0.05) and F > F table (11,352 > 3), it can be concluded that the variables of access control, supervision and strengthening of territory affect the perception of a sense of security during the pandemic in the city of Makassar.

Partial Hypothesis Test (T Test)

Table 8. Partial Hypothesis Test (T Test) (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Variable</th>
<th>t_count : t_table</th>
<th>Prob Sig</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t_count  : t_table</td>
<td>Sig</td>
<td>α = 0.5 %</td>
</tr>
<tr>
<td>Access Control</td>
<td>-2.424 : 2</td>
<td>0.023</td>
<td>0.05</td>
</tr>
<tr>
<td>Supervision</td>
<td>4.718 : 2</td>
<td>&lt;0.001</td>
<td>0.05</td>
</tr>
<tr>
<td>Territorial Strengthening</td>
<td>-0.041 : 2</td>
<td>0.968</td>
<td>0.05</td>
</tr>
</tbody>
</table>
The effect of access control on a sense of security during a pandemic
Based on the results of the t test hypothesis, where the calculated t value is smaller than the table t and the significance probability value is smaller than 0.05. This shows that access control variables have no but significant effect on the sense of security during the pandemic.

The effect of surveillance on a sense of security during a pandemic
Based on the results of the t test hypothesis, where the calculated t value is greater than the table t and the p-value of the significance probability is less than 0.05. This shows that the supervision variables have an effect and are significant in the sense of security during the pandemic.

The effect of strengthening territory on a sense of security during a pandemic
Based on the results of the t test hypothesis, where the calculated t value is smaller than the table t and the significance probability value is greater than 0.05. This shows that the variable of territorial strengthening has no effect and is not significant to the sense of security during the pandemic.

Coefficient of Determination (Adjusted R²)

Table 9. Coefficient of Determination Results (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.753⁹</td>
<td>0.567</td>
<td>0.517</td>
<td>0.63419</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), territorial strengthening, access control, surveillance

Based on calculations, the adjusted value of R² of 0.517 means that independent variables consisting of access control, supervision and strengthening of territories contribute 75% to the sense of security during the pandemic, so that there are independent variables outside this regression model that affect the sense of security during the pandemic in the city of Makassar as much as 25%.

Analysis of the Effect of CPTED on Security during a Pandemic
Access control, supervision and strengthening of territories affect spatially the sense of security during the pandemic in Makassar city
Access control is a principle that regulates entry and exit or limits the number of people in and out of and out so as to prevent unauthorized people from entering the environment (Zahm 2007). In line with Fennelly & Criminology (2013) Such access control may be implemented by restricting the number of entries and exits to residential communities, with a maximum of two accesses in and out of the community at any one time. According to the findings of the research, which demonstrated that access control had a calculated t value of -2.424 and a significant value of 0.023 smaller than 0.05 (0.023 < 0.05), the outcomes of the multiple regression analysis yielded a negative value of -0.435. Therefore, the value of the hypothesis known as "access control (X1)" demonstrates that it does not have an influence but is substantial. In accordance with Fennelly & Criminology (2013) Since there is only one entrance and exit, it is much simpler for security professionals as well as homeowners to keep an eye on anybody who is entering their area, which is one reason why this is an effective CPTED idea. In order to avoid or reduce the likelihood of criminal activity and the transmission of the COVID-19 virus.

The term "surveillance" refers to the ability of an environment to create situations in which individuals are able to monitor the activities of one another (Johnson et al., 2014). The results
of the study showed that the surveillance had a calculated t value of 4,718 with a significant value of 0.001 smaller than 0.05 (0.001 0.05), and the results of the multiple regression analysis had a positive value of 0.843. These findings are based on the findings of the study, which showed that the value of t was calculated to be 4,718. Therefore, according to the hypothetical value of "monitoring (X2)," the occupant's feeling of security will improve if there is a corresponding rise in the amount of supervision. Peltzman (1998) presented a hypothesis that asserts that individuals are more willing to participate in dangerous activity when there have been precautions made to ensure their safety. This sense of security then leads to a rise in risk appetite, which is the desire to accept chances when one has the impression that they are safe.

The phrase "territorial reinforcement" refers to an aspect of territory that gives property owners the ability to demarcate their own property and limit access by erecting physical or symbolic obstacles (Armitage 2000). According to the findings of the research, the consolidation of the territory had a calculated t value of 2,192, and it had a significant value of 0.968 that was larger than 0.05 (0.968 > 0.05). However, the findings of the multiple regression analysis had a negative value of -0.008. Therefore, the value of "territory strengthening (X3)" in the null hypothesis demonstrates that it is influential but not significant. According to Fennelly & Criminology (2013) that the identity of territorial strengthening may differentiate between private regions and public places to avoid violations by criminal activities, and that this can help prevent violations. This has the additional benefit of preventing the spread of COVID-19, which is more likely to occur in residential settings.

**Access Control, Supervision and Strengthening of Territories Stimulantly Affect the Sense of Security during the Pandemic Period in Makassar City**

The fact that the significant value is less than 0.05 (0.001 0.05) and that F > F table (11,352 > 3) allows one to draw the conclusion that the variables of access control, supervision, and territorial strengthening each have an influence on taste, either simultaneously or when coupled together. safe in the city of Makassar during the epidemic, and their contribution accounted for 75% of the total, while the other 25% was affected by a variety of other factors.

**Supervision is the Most Dominant Variable on the Feeling of Security during the Pandemic Period in Makassar City**

According to the results of the partial test (t test) conducted between the variables of access control, supervision, and territory strengthening, the t-value of access control is -2.424, with a regression coefficient of -0.435, and a significance of 0.023. The t-value of supervision is 4.718, with a regression coefficient of 0.843, and a significance of 0.001. The t-value of reinforcement is also a t-value. a region of 10.297 with a regression coefficient of 0.008 and a significance level of 0.968.

The findings of this research demonstrate that the monitoring of a feeling of security is more important than the restriction of access and the reinforcement of territorial boundaries. As a result, the supervision of the sense of security needs to receive a greater amount of attention in order to ensure that the residents of housing continue to feel a greater sense of security and that housing can become more resilient, thereby reducing the risk of criminal activity and the spread of the COVID-19 virus within housing in the city of Makassar. In accordance with Arifin et al. (2020) that the perception of the occupant’s sense of security is low where of the 7 assessment indicators, there are only 2 indicators with scores above the standard, namely the housing security boundary condition indicator and the patrol system with a score of 61% - 64%. This shows that it is necessary to improve, especially in indicators that support security or surveillance systems as the purpose of the CPTED concept.
Transmission Vulnerability and Increased Transmission of Covid-19

Multiple Regression Analysis

This analysis used to calculate the magnitude of the influence of socioeconomic mixing vulnerability, housing vulnerability and infrastructure vulnerability to increased Covid-19 transmission can be seen through the regression equation in the following table:

Table 10. Multiple Regression Analysis Results (output SPSS, 2021)

<table>
<thead>
<tr>
<th>Type</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>0.206</td>
<td>0.631</td>
<td>0.327</td>
<td>0.746</td>
</tr>
<tr>
<td>The Vulnerability of Socioeconomic Mixing</td>
<td>0.613</td>
<td>0.207</td>
<td>0.547</td>
<td>2.970</td>
</tr>
<tr>
<td>Housing Vulnerabilities</td>
<td>0.015</td>
<td>0.192</td>
<td>0.015</td>
<td>0.079</td>
</tr>
<tr>
<td>Infrastructure Vulnerabilities</td>
<td>0.271</td>
<td>0.135</td>
<td>0.303</td>
<td>2.016</td>
</tr>
</tbody>
</table>

Based on the table, the value of the socioeconomic mixing vulnerability coefficient (X1) was obtained at 0.613, housing vulnerability (X2) at 0.015 and infrastructure vulnerability (X3) at 0.271. Thus, the value of the calculation result of the regression analysis is formulated into the following equation:

\[ Y = 0.206 + 0.613X1 + 0.015X2 + 0.271X3 \]

Multiple Regression Test (Test F)

Table 11. Multiple Regression Test (F Test) (SPSS output, 2021)

<table>
<thead>
<tr>
<th>Type</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>16.582</td>
<td>3</td>
<td>5.527</td>
<td>10.402</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Residual</td>
<td>13.816</td>
<td>26</td>
<td>0.531</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30.399</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of data processing, the significance value is less than 0.05 (<0.001 <0.05) and F > F table (10,402 > 3), it can be concluded that the infrastructure vulnerability, socioeconomic mixed vulnerability, and housing vulnerability have an effect on increasing the spread of Covid-19 in Indonesia. Makassar city.

Partial Hypothesis Test (T Test)

Table 12 Partial Hypothesis Test (T Test) (SPSS output, 2021)

Based on the results of data processing, the significance value is less than 0.05 (<0.001 <0.05) and F > F table (10,402 > 3), it can be concluded that the infrastructure vulnerability, socioeconomic mixed vulnerability, and housing vulnerability have an effect on increasing the spread of Covid-19 in Indonesia. Makassar city.
Partial Hypothesis Test (T Test)

Table 12. Partial Hypothesis Test (T Test) (SPSS output, 2021)

<table>
<thead>
<tr>
<th>Variable</th>
<th>t_count</th>
<th>t_table</th>
<th>Prob</th>
<th>Sig</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Vulnerability of Socioeconomic Mixing</td>
<td>2.970</td>
<td>2</td>
<td>0.006</td>
<td>0.05</td>
<td>Significant</td>
</tr>
<tr>
<td>Housing Vulnerabilities</td>
<td>0.079</td>
<td>2</td>
<td>0.937</td>
<td>0.05</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Infrastructure Vulnerabilities</td>
<td>2.016</td>
<td>2</td>
<td>0.054</td>
<td>0.05</td>
<td>Insignificant</td>
</tr>
</tbody>
</table>

The effect of the vulnerability of socioeconomic mixing on the increase in Covid-19 transmission

Based on the results of the t test hypothesis, where the calculated t value is greater than t of the table and the probability value of its significance is smaller than 0.05. This shows that the vulnerability variables of socioeconomic mixing have an effect and are significant in increasing the transmission of Covid-19.

The effect of housing vulnerability on increasing covid-19 transmission

Based on the results of the t test hypothesis, where the calculated t value is smaller than the table t and the significance probability value is greater than 0.05. This shows that the variable vulnerability of housing has no effect and is not significant to the increase in Covid-19 transmission.

The effect of infrastructure vulnerability on increasing Covid-19 transmission

Based on the results of the t test hypothesis, where the calculated t value is greater than the table t and the significance probability value is greater than 0.05. This shows that the variable vulnerability of infrastructure has an effect but not significantly on the increase in covid-19 transmission.

Coefficient of Determination (Adjusted R2)

Table 13. Coefficient of Determination Result (SPSS output, 2021)

<table>
<thead>
<tr>
<th>Model Summary</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.739a</td>
<td>0.54</td>
<td>0.493</td>
<td>0.72897</td>
</tr>
<tr>
<td>a. Predictors: (Constant), Infrastructure, Socioeconomic Mixing, Housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on calculations, the adjusted R2 value of 0.493 means that the independent variables consisting of infrastructure vulnerability, socioeconomic mixed vulnerability, and housing vulnerability contributed 54% to the increase in Covid-19 transmission, so there are independent variables outside this regression model that affect the increase in transmission. Covid-19 in the city of Makassar by 46%.

Analysis of the Effect of Transmission and Increase in Covid-19 Transmission

Vulnerability of Socio-Economic Mixing, Housing Vulnerability and Infrastructure Vulnerability Affect Spatially to Increase Covid-19 Transmission in Makassar City

In the context of satisfying socio-economic requirements, "socio-economic mixing" refers to the intensity of social contact as well as mobility or migration of individuals from one location to another. Because of this, the government is starting to restrict the interaction and dynamics of human movement in groups, which has become a major problem. The findings of the study indicated that the vulnerability of socioeconomic mixing had a t count of 0.327, with a
significant value of 0.006 less than 0.05 (0.006 0.05), and the findings of multiple regression analysis had a positive value of 0.613. The study was carried out in order to determine whether or not there was a correlation between the two variables. If this is the case, the significance of the hypothesized variable known as "susceptibility to socio-economic mixing (X1)" suggests that there will be an increase in the rate of COVID-19 transmission if there is also a rise in the susceptibility of socio-economic mixing.

The housing environment poses a significant threat of Covid-19. What is meant by "housing" in Law no. 1 of 2011 is a collection of houses that are a part of settlements, both urban and rural, that are equipped with infrastructure, facilities, and public utilities as a result of efforts to fulfill livable houses. This definition applies to both urban and rural settlements. The findings of the research indicate that housing vulnerability has a tcount value of 2.970, a significant value of 0.937 larger than 0.05 (0.937 > 0.05), and the findings of multiple regression analysis have a positive value of 0.015. These findings are based on the findings of the study. The result of this is that the value of the hypothesis, which is "housing vulnerability (X2)," demonstrates that it does not have an impact and is not significant. Each settlement has distinct physical characteristics that determine the degree to which it is possible for people to move around (both inside and outside), such as the number of entry points, the physical barriers, the road network, and the housing density. Residents of the settlement are the ones who need to decide what actions to take (Wilkinson et al. 2020). Overcrowding makes physical distancing and quarantine activities ineffective, so the spread of viral infections is very likely to occur quickly (Snyder & Tormala, 2017).

In this context, "infrastructure" refers to the fundamental facilities or buildings, equipment, and installations that are constructed and required for the operation of both the social system and the economic system of the community (Grigg & Darrel, 2000). The findings of the study indicate that the degree of infrastructure vulnerability has a tcount value of 0.079 and a significant value of 0.054 that is greater than 0.05 (0.054 > 0.05). Furthermore, the findings of multiple regression analysis indicate that this degree of vulnerability has a positive value of 0.271. If this is the case, the value of the hypothesis, which is "infrastructure vulnerability (X3)," demonstrates that the variable does have an impact, but the effect is not statistically significant. The function of supporting infrastructure for PHBS (Clean and Healthy Lifestyle), which is especially crucial in the case of the Covid-19 epidemic, is highly vital to limit the danger of spreading the disease. Lack of public services, such as toilets, hand washing facilities, and the availability of clean water both at home and in public facilities, can contribute to the stronger and faster spread of disease. Some examples of basic infrastructure include toilets, hand washing facilities, and the availability of clean water (Sommer et al., 2015).

**Mixed Vulnerability of Socio-Economic, Housing Vulnerability and Infrastructure Vulnerability have Stimulant Effect on the Increase in the Transmission of Covid-19 in Makassar City**

The results of the partial test (t test) between the variables of social mixing, housing mixing, and infrastructure mixing show that the t-value of social mixing is 0.327, with a regression coefficient of 0.613, and a significance of 0.006; the t-value of housing mixing is 2.970, with a regression coefficient of 0.015, and a significance of 0.937; and the t-value of infrastructure mixing is 0.079, with a regression coefficient of 0.271.

Because the significance value is less than 0.05 (0.001 0.05) and F > F table (10.402 > 3), it is possible to draw the conclusion that the variables of infrastructure vulnerability, vulnerability to socio-economic mix, and housing vulnerability all have an effect simultaneously or have an effect when combined. This is because the significance value is less than 0.05 and F > F table. 54 percent of the rise in the transmission of Covid-19 in the city of Makassar may be attributed

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to both of these factors working together, while the remaining 46 percent is attributable to the effect of other variables.

**Vulnerability of Socio-Economic Mixing is the Most Dominant Variable to the Increase in the Transmission of Covid-19 in Makassar City**

According to the findings of this research project, the susceptibility of the socio-economic mix to an increase in the transmission of Covid-19 is larger than the susceptibility of the housing and the infrastructure. Therefore, greater attention should be made to the sensitivity of the socio-economic mix to transmission of Covid-19 in order to avoid or decrease transmission of Covid-19 in housing so that housing may become more resistant to the pandemic in housing in the city of Makassar.

Limiting the combination of substances will almost surely result in a lower chance of transmitting COVID 19. Mobility is widespread both inside cities and between cities due to the fact that people of cities routinely commute between urban and rural environments for reasons related to job and social activities. In addition, typically traveling when unwell puts a person at danger of transmitting Covid-19 to rural regions, therefore this factor has to be taken into consideration while developing control tactics. Additionally, the socioeconomic mix in which children are often cared for by grandparents or other older family members, which raises the likelihood of transmission of the disease. If there is no implementation of physical distance, then there is an increased possibility of the Covid-19 virus being transmitted.

**Pandemic Resilient Sustainable Settlement Model**

The widespread COVID-19 outbreak has made life rather miserable for the vast majority of people. According to Carvajal-Miranda et al. (2020), the pandemic condition exerts its own demand on each person, communally, and in the community. Azhari (2021) reported on the psychological strain that informants felt due to government rules during the Covid-19 pandemic in his study. This pressure was tied to the epidemic. When it comes to the management model, China is the nation that is most frequently used as a reference. This is due to the fact that the Covid-19 virus was first discovered on Chinese soil, where the government enacted a stringent regional quarantine policy in almost all of the cities that were affected. The next country to serve as a model is South Korea, which implemented a regional quarantine that was only partially effective along with mass testing, contact tracing, isolation, and further quarantine for people who tested positive for Covid-19, all under extremely stringent surveillance.

The management of Covid-19 poses significant difficulties for settlements, but the measures that have been established have the potential to minimize the most severe outbreaks provided that action is done promptly. It is very necessary for towns and local governments to be prepared and to take immediate action. When an epidemic has already begun, its severity might quickly worsen, leaving little space for additional preparation. Because of the high level of vulnerability that communities have to Covid-19 and the potential for control methods to cause more damage, the first step in mitigating either threat must be to include inhabitants and their circumstances in the planning process.

Suharso (2020) remarked that in the present day, natural catastrophes are the only ones included in disaster resilience in Indonesia. In light of what was learned during the pandemic caused by the Corona Virus (Covid-19), it will be required in the year 2021 to put in place a resilience system for man-made disasters in order to be prepared in the event that similar outbreaks occur. Planners use the word "resilience" to refer to the capacity of a system to withstand "shocks," which are abrupt changes in the economic, social, or environmental conditions of an area. The
following is a list of the numerous control measures and factors to consider while dealing with the pandemic resilient sustainable housing model:

**Improve Oversight**

**Physique**

For the purposes of carrying out monitoring activities related to the execution of health protocols, the primary entrance to the dwelling unit in question must be unobstructed and large. Housing patterns that support the position of public spaces can be accessed evenly by residents. This ensures that there is no public space that exceeds the capacity of its visitors and facilitates supervision in public spaces. Housing patterns that support the position of public spaces can be found here. The plan that the Indonesian government has devised to combat the spread of the Covid-19 virus is regulated by both the Presidential Decree and the Public Health Act. In general, these prohibitions do not apply to any operations that take place outside of a location that is thought to be contaminated with COVID-19. This is done with the intention of preventing the probable spread of Covid-19 so that individuals may still go about their everyday lives, although subject to some limitations.

**Non Physical**

Putting inherent supervision, which consists of inhabitants of a housing complex mutually watching and reminding one another, into an institutional setting. The government should continue to be open and forthcoming with information in the interest of maintaining and bolstering the public's faith in its institutions, and the media should broadcast in a way that takes into account the principles of social psychology. In addition, either information should be made available or steps should be taken to boost public faith. By establishing a disaster relief organization that is free from stigma and prejudice, it will be possible to enlist the involvement of housing inhabitants in the capacity of supervisors.

**Reducing Socio-Economic Mixing by Maintaining Physical Distance / Social Distancing**

**Physique**

Make clear boundaries on housing between private, semi-private and public spaces. The width of the road allows interaction between residents with a minimum distance of 1 meter. Housing with stable internet facilities that support socio-economic interaction can run online. Creating a healthy, comfortable and conducive home for work and worship.

**Non Physical**

Each house is the smallest disaster mitigation organization in a housing estate. Institutionalizing in the 4 M household, especially the habit of keeping a distance in interacting. There is government intervention in making policies that can reduce socio-economic interactions without making people lose their livelihoods or unable to meet family needs.

**Resilience Principle**

**Physique**

Housing infrastructure must be guaranteed to be strong and flexible such as sanitation, clean water, solid waste and especially a stable telecommunications network to provide residents convenience in interacting online. Resilience of residents in carrying out activities throughout the day in the house requires an area of space, ventilation and lighting according to standards. According to Poon (2020) To reduce insulation stress, homes need adequate space with light and ventilation, plus an outdoor area such as a balcony, courtyard or rooftop garden. Every house has a room that is conducive to being an isolation room. Good for family members who
are being exposed or residents who are susceptible / comorbid (comorbidities). Housing must be equipped with health facilities that provide counseling, understanding and awareness to the community and provide emergency services that are always on standby.

Non Physical

Establishment of a disaster response mitigation organization run by housing residents with the support of the local government.

Sustainability Principles (Regulation of the President of the Republic of Indonesia 2017):

Physique

Planning housing equipped with various facilities that are capable of being an economic generation space for each productive house in the vicinity, especially those with low income, physical disabilities or other special needs and these facilities can be reached even on foot. Provision of green open space according to the standard number of residential residents

Non Physical

Applying local wisdom of mutual cooperation in realizing housing resilience. With a high tolerance social capital to create housing that is inclusive, safe, resilient and sustainable.

Conclusion

The results of this study prove that supervision greatly affects the sense of security in housing in Makassar City. Supervision is more influential than access control and territorial strengthening. Therefore, more attention must be paid to supervision so that the sense of security of housing residents continues to increase so that housing becomes resilient both against crime and the spread of Covid-19 in housing in the city of Makassar. The vulnerability of socio-economic mix to increased transmission of Covid-19 is greater than the vulnerability of housing and infrastructure. Although overall all three support each other. Therefore, the three types of vulnerabilities must be considered so that the transmission of Covid-19 in housing can be prevented or minimized so that housing in Makassar City becomes resilient to the pandemic. There are various control strategies/considerations with a pandemic resilient sustainable housing model, namely increasing supervision, limiting/reducing socio-economic mixing, principles of resilience and sustainability.

References


