



MR-COV 19: ANDROID-BASED COVID-19 RISK PREDICTION APPLICATION WITH SENSITIVITY AND SPECIFICITY TESTS

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Abstract. Background. Therefore, the development and use of accurate predictors of susceptibility for COVID-19 prognosis will be beneficial for COVID-19 risk management, and will help reduce case and mortality rates. The aim of this researcher is to build an Android-based MR-Cov-19 application in order to reduce the impact of the spread of disease and increase community resilience against COVID-19.

Method. This study uses the prototype method in designing and building applications. To test this application, researchers conducted an android-based MR-Cov-19 screening test on 30 communities for self-assessment and 30 for institutional assessment in Padang City from July to August 2022, whose data were then tested for validity and reliability. This method is a 2x2 tabulation diagnostic confirmation tool that produces sensitivity, specificity, predictive value, and prevalence

Result. The MR-Cov19 application can determine the risk of covid-19. The MR-Cov19 application has been tested for validity and reliability using the android-based MR-Cov 19 test with 77.8% and 71.4% results. Based on the Positive Predictive Value (NPP) test, the results show 53.8% and the Negative Predictive Value (NPN) 88.2%, meaning that the NPP value is lower than the NPN

Conclusion. This MR-Cov19 application was built using android studio programming which can detect an individual at risk of covid-19. This android-based EPDS design has a home screen form design, a questionnaire form design and a result form design. This application displays results based on the multiplication of weights and scores for vulnerability, exposure, sensitivity and adaptive capacity.

Keyword. M-Cov 19, prediction, Covid-19

Introduction

The COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a global crisis across the dimensions of health, economy, and education. The disease spreads rapidly, can cause severe illness, and is characterized by a high mortality rate in certain groups ¹.

The ongoing spread of Covid-19, the most possible action to reduce and prevent Covid-19. One type of prevention carried out when identifying vulnerabilities both independently and institutionally for COVID-19.

Mortality is very high if no standard management measures have been shown to be effective. One of the problems in the management of this disease is the absence of standard methods for diagnosis and the inability to estimate COVID-19 susceptibility. Certain reports indicate that poor prognostic predictions are correlated with an increase in the number of COVID-19 cases. ².

Therefore, the development and use of accurate predictors of susceptibility for COVID-19 prognosis will be beneficial for COVID-19 risk management, and will help reduce case and mortality rates. Successful implementation of predictive mechanisms can have a major impact on public health. A better understanding of clinical developments could also improve public health messaging, especially as many people perceive COVID-19 as less severe ³.

The COVID-19 susceptibility prediction tool in patients has been developed since January 2022. It is necessary to evaluate the accuracy of this application using MR-Cov-19. The development of disease susceptibility prediction applications can help the community in recognizing conditions to immediately seek medical attention.

Information technology, especially android-based applications, can be a solution for using MR-Cov-19 by individuals, without having to depend on health workers. Android is one of the most popular mobile operating systems, with many users and

growing every day. Taking this into account, researchers will create a COVID-19 risk prediction application. So that people can download applications and screen for COVID-19 susceptibility, if a high vulnerability is detected, the community can increase their adaptive capacity. This will increase community resilience in the face of the COVID-19 disaster. The aim of this researcher is to build an Android-based MR-Cov-19 application in order to reduce the impact of the spread of disease and increase community resilience against COVID-19.

Methods

This study uses the prototype method in designing and building applications. A prototyping methodology is defined as a Software Development model in which a prototype is created, tested and then reworked as needed until an acceptable prototype is reached. The prototyping model consists of six MR-Cov-19 phases. 1) Step 1: Gathering and analyzing needs by interviewing the community and the COVID-19 task force to find out what they expect from the system. 2) Step 2: Preliminary design or quick design. At this stage a simple system design is made. Quick design helps in developing prototypes. 3) Step 3: Create a Prototype based on the information gathered from fast design. 4) Step 4: Initial user evaluation. It helps to know the strengths and weaknesses of the working model. Comments and suggestions are collected from users and experts and provided to developers. 5) Step 5: Improve the prototype If the user is not happy with the current prototype, it is necessary to improve the prototype according to the user's input and suggestions. 6) Step 6: Implement the Product and Maintain ⁴.

Once the final system is developed based on the final prototype, it is thoroughly tested and applied to production. To test this application, researchers conducted an android-based MR-Cov-19 screening test on 30 communities for self-assessment and 30

for institutional assessment in Padang City from July to August 2022, whose data were then tested for validity and reliability. Before conducting the validity test on 30 respondents, the instrument was tested for validity by three experts. The validity test used is the Content Validity Index (CVI) test with a CVI value of 0.78 as a standard to determine the quality in the content validity scale of the instrument. The CVI value of 3 experts on the instrument is 0.95. After that, sensitivity and specificity tests were carried out. This method is a 2x2 tabulation diagnostic confirmation tool that produces sensitivity, specificity, predictive value, and prevalence.

Sensitivity is the probability of a case being correctly diagnosed or the probability of each case being identified by a screening test. Sensitivity is described as the percentage of people with the disease who test positive. The sensitivity formula can be seen in equation 1:

$$\text{sensitivity} = \frac{\text{True Positive}}{\text{true Positive} + \text{false Negative}} \times 100$$

Specificity based on the epidemiological dictionary is the proportion of people who actually have COVID-19 and still don't have COVID-19 when identified through screening tests. This is a measure of the probability of correctly identifying a person who is not sick with a screening test. Specificity is a measure that measures how well a screening test classifies people who are not sick as people who do not actually have the disease. The specificity formula can be seen in equation 2:

$$\text{specificity} = \frac{\text{True Negative}}{\text{False Positive} + \text{True Negative}} \times 100$$

Positive Predictive Value (NPP) is the proportion of very positive (truly positive) patients among all COVID-19 sufferers who show positive confirmatory test results. This value explains how likely it is that a positive test result indicates covid 19. The NPP formula can be seen in equation 3

$$NPP = \frac{\text{True Positive}}{\text{true Positive} + \text{false Positive}} \times 100$$

Negative Predictive Value (NPN) is the percentage of all patients who are truly negative (healthy/truly negative) among all patients who show a negative test result. The NPN formula can be seen in equation 4:

$$NPN = \frac{\text{True Negative}}{\text{True Negative} + \text{False Negative}} \times 100$$

When compared to gold standard testing, the positive predictive value is the probability that a subject positively identified by the measuring instrument will be positive according to the gold standard later. While the negative predictive value is the probability that the subject identified negatively by the measuring instrument will actually be negative according to the gold standard in the future⁵.

Result

Research has produced a design for an Android-based Covid 19 risk prediction application, which looks as follows:

- The initial display (Home Screen) of the application can be seen in Figure 1



Figure 1 Initial screen (Home Screen) of the MR-Cov19 application

Based on Figure 1, it shows the Home Screen Form design from the android-based covid 19 risk prediction application, where this home screen shows how to fill in the android-based covid 19 risk prediction application.

The android-based covid-19 risk prediction application consists of 2 actors, namely Fillers (RT members and employees) and Admin (Application Administrators). Where when the application is run, the Filler will fill in the personal data. After filling in the personal data the Filler will fill out the questionnaire displayed by the Application. After filling out the questionnaire, the Filler will immediately be able to see the score and results, whether the Filler is indicated to be exposed to the risk of Covid-19 or not. Admin after logging into the application can print the Filler report and can also see the score and results of each one

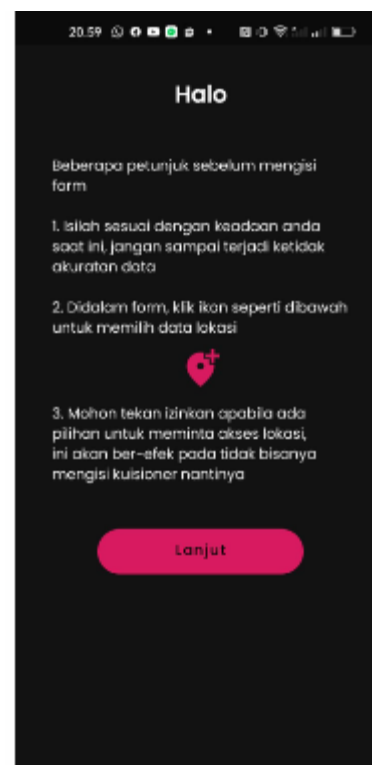


Figure 2 instructions for charging MR Cov 19

In this study the respondents are expected to provide answers about activities . Questionnaire answers must be answered and must come from family members themselves and questions are not discussed with others. Individuals must complete this questionnaire on their own unless they have difficulty understanding language and difficulty reading. If the individual has understood these instructions then the individual can proceed to filling out the questionnaire.

- Activity Biodata Filling Form

Figure 3. Curriculum vitae Filling Activity

Based on Figure 3, the curriculum vitae filling activity starts from the Filler filling in the Biodata Form, then the system will validate, if it is true then the Filler's biodata will be stored in the database, but if it is not correct then the process will return to filling out the biodata.

- Android-based Questionnaire Form Activity filling out the questionnaire can be seen in Figure 4

Figure 4 Filling out the questionnaire

Table. 1 Validity and Reliability of MR-Cov Applications Based on Android

MR-Cov 19	covid19		Validity (%)			
	Yes	No	sensitivity	spesifisity	NPP	NPN
Risk	7	6	77,8	71,4	53,8	88,2
No risk	2	15				
Total	9	21				

Based on Table 1 shows the results of the sensitivity and specificity test of the android-based MR-Cov 19 with the results of 77.8% and 71.4%, respectively. Based on the Positive Predictive Value (NPP) test, the results are 53.8% and the Negative Predictive Value (NPN) is 88.2%, meaning that the NPP value is lower than the NPN.

Discussion

The results of this study provide a sensitivity value of 77.8% and a specificity of

71.4%. The positive and negative predictive values obtained in this study were 53.8% and 88.2%, respectively. The positive predictive value indicates the possibility of the individual experiencing the risk of covid 19. The negative predictive value indicates the possibility that the individual does not experience the risk of covid 19. The positive predictive value and the negative predictive value as parameters in the diagnostic test are interpreted as good if they have a value of 80%, which in this study has not been achieved .

Risk prediction for covid-19 through the MR-Cov 19 application needs to always be developed to detect individuals who are in

danger of covid-19. Early recognition can anticipate the spread of covid-19 through indicators of vulnerability, exposure, sensitivity and adaptive capacity. The high density and sensitivity will be prevented from increasing the adaptive capacity of each individual in the household and institutional environment. To be able to apply the three main principles of preventing infection transmission, it is necessary to increase knowledge about the transmission of COVID-19 disease, change attitudes to implement health protocols, and change behavior in implementing a clean and healthy lifestyle by all levels of society. Increased knowledge and changes in attitudes and behavior are the basis for implementing health protocols to prevent transmission of COVID-19 infection in the community¹.

Similarly, Android app development could be the latest step in introducing Covid-19 risks. Android technology devices are currently the most developed (6). So the MR-Cov 19 application needs to always be developed so that it can measure individual risk predictions due to COVID-19.

This Android-based application for the introduction and prevention of the dangers of the Covid-19 virus has provided information about the introduction, prevention and healthy lifestyle. This is shown from the percentage results obtained in the survey, 85.6% strongly agree, that the application made is delivered right on target⁷.

Conclusion

This MR-Cov19 application was built using android studio programming which can detect an individual at risk of covid-19. This android-based EPDS design has a home screen form design, a questionnaire form design and a result form design. This application displays results based on the multiplication of weights and scores for vulnerability, exposure, sensitivity and

adaptive capacity. The MR-Cov19 application can determine the risk of covid 19. The MR-Cov19 application has been tested for validity and reliability using the android-based MR-Cov 19 test with 77.8% and 71.4% results. Based on the Positive Predictive Value (NPP) test, the results show 53.8% and the Negative Predictive Value (NPN) 88.2%, meaning that the NPP value is lower than the NPN

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