

The Effectiveness of SI-DINI Mobile App (an Education and Early Detection of Leprosy App) on Changes in Community Behavior

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History

- Submission Date: 19-07-2023;
- Review completed: 21-08-2023;
- Accepted Date: 16-09-2023.

DOI : 10.5530/pj.2023.15.166

Article Available online

<http://www.phcogj.com/v15/i15>

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ABSTRACT

Most leprosy case detection in Indonesia is based on passive surveillance. This condition impacts the high number of new cases of leprosy and the disability rate of leprosy. Data from the Ministry of Health of the Republic of Indonesia stated that for 2021, there were 7,201 new cases of leprosy with a disability proportion of 84.6%. The community's reluctance to make early contact is due to low knowledge and fear of stigma. SI-DINI is an android-based application that contains information about leprosy, videos on identifying the characteristics and symptoms of leprosy, and reporting suspected leprosy so that it is hoped that it can change people's behavior in a positive direction. This study aims to see the effectiveness of the SI-DINI App in changing people's behavior. This study used a quasi-experimental design with a pre and post-test design with intervention and control groups. The use of the SI-DINI App has been proven effective in changing people's behavior in terms of knowledge, attitudes and actions. There is a significant increase in the knowledge aspect with p-value = 0.000 ($p < 0,05$), the attitude aspect p-value = 0.000 ($p < 0,05$), and the action aspect p-value = 0.000 ($p < 0,05$). It is hoped that the application of education and surveillance for early detection of leprosy (SI-DINI) can be applied on a broader scope and can be used sustainably and in the future.

Key words: SI-DINI App, Leprosy, Knowledge, Attitude, Behavior.

INTRODUCTION

Leprosy is a chronic infectious disease caused by mycobacterium leprae.¹ This disease is included in the category of neglected tropical diseases (NTDs).² Leprosy attacks the skin, peripheral nerves, and other body tissues. In addition to medical problems, leprosy involves changes in the social, economic and cultural conditions of sufferers and their families.³

Data from the Ministry of Health of the Republic of Indonesia stated that for 2021, there were 7,201 new cases of leprosy with a disability proportion of 84.6%. This shows that the transmission of leprosy is still ongoing, and there are still many cases of leprosy in various regions of Indonesia. In addition, 15.4% of leprosy cases were detected too late, so second-level defects were found in the patient's body, and the proportion of new cases with second-level defects was 5.15%. Meanwhile, the proportion of new leprosy cases in children was 10.9%. Cases in children are classified as high because the target should be less than 5% spread across 27 provinces. The Covid-19 pandemic has more or less had an impact on the performance of leprosy alleviation so that the findings of leprosy cases as of January 24 2022 were 13,487 active leprosy cases.⁴

The problem of leprosy is not only about sufferers. On the other hand, many obstacles occur, among others, the need for more facilities/infrastructure for information dissemination, which results in not fulfilling the community's need for access to knowledge about leprosy and has an impact on high misunderstandings about leprosy itself.^{5,6} In

addition, the reporting system still uses the manual method, so feedback on leprosy services in the community sometimes experiences delays.⁷ The final result of this series of problems is the number of early detections of leprosy, which still needs to be higher, especially based on the results of passive surveillance.

Education is an important point that must be studied regarding knowledge, attitudes, and actions in society, which is the domain of people's behavior.⁸ In handling leprosy, in addition to education on prevention and treatment, it is needed so that people understand the early detection of leprosy and the initial actions they need to take, including when and how to contact officers. Educational points that are minimally known include how to do self-detection with temperature sensitivity and understanding the primary differences between leprosy and similar skin diseases. It is hoped that the community will access health facilities as early as possible to get an examination and management of their condition.⁹

Android technology has a broad role in social life at this time. This convenience can be utilized in surveillance, especially early detection of disease.¹⁰ The SI-DINI application is a newly designed application available in the Play Store, so it is easy to access. The SI-DINI application menu includes information about leprosy, videos on identifying the characteristics and symptoms of leprosy, and reporting suspected leprosy (spotting reports). The development of the leprosy early detection application (SI-DINI) is intended for the public to communicate their condition without feeling intimidated or afraid of the stigma and discrimination due to the leprosy they suffer.

Cite this article: Lapui M, Wahiduddin, Maria IL, Arsin AA, Thaha RM, Manyullei S, et al. The Effectiveness of SI-DINI Mobile App (an Education and Early Detection of Leprosy App) on Changes in Community Behavior. *Pharmacogn J.* 2023;15(5): 868-872.

SI-DINI App is made simple and easy to apply on an ongoing basis; thus, it is hoped that it will increase the early detection of leprosy spots. Based on the problems above, it is necessary to conduct a study that utilizes an application for early detection of leprosy in changing the domain of people's behavior in the form of knowledge, attitudes, and action.¹¹

METHOD

This study used a quasi-experimental design with a pre and post-test design with intervention and control group.¹² Experimental and quasi-experimental research designs examine whether there is a causal relationship between independent and dependent variables. Simply defined, the independent variable is the variable of influence and the dependent variable is the variable that is being influenced.¹³ The effect of the treatment is assessed by comparing the pre-test and post-test values, which can be described as follows:

Pre-Post Test			
Group 1 (Intervention Group)	O1 -----X1 -----O2		
Group 2 (Control Group)	O3 -----X1 -----O4		

O1: Observation of the community regarding reports of suspected leprosy spots and knowledge, attitudes and actions of the action group before being given an intervention.

O2: Observations in the community regarding the reporting of suspected leprosy spots as well as the knowledge, attitudes and actions of the action group after being given an intervention.

O3: Observation of the community on reports of suspected leprosy spots and knowledge, attitudes and actions of the control group before being given intervention.

O4: Observations in the community regarding the reporting of suspected leprosy spots, as well as the knowledge, attitudes and actions of the control group after being given the intervention.

X1: Providing Intervention.

The sample size in this study was obtained based on the two-proportion formula developed by Casagrande, Pike and Smith with a total sample of 202 respondents. The sampling method was carried out using non-probability sampling (purposive sampling), which is a sampling technique based on the researcher's considerations about which sample is most useful for implementing the SI-DINI application, namely people who live side by side with leprosy sufferers who have a high risk of contracting leprosy. Data analysis was conducted by conducting different intervention tests using the paired t-test for normally distributed data and the Wilcoxon test for non-normally distributed data.

RESULT

Reporting of spotted leprosy suspects after using SI-DINI app

Data from reporting suspected leprosy spots after using the SI-DINI App in Table 1. shows an increase in the number of suspected leprosy case reports each month, with the highest number in Apr 2023 with 14 suspected leprosy. To see more clearly the ratio of increasing cases before and after using the application furthermore can be seen in the following figure 3.

Homogeneity test of knowledge, attitudes, and action of respondents

In table 1 it is known that the three variables have a significant value (F) <0.05, so the variable is not homogeneous.

Table 1: Reporting of spotted leprosy suspects after using SI-DINI app.

Month	Number of Leprosy Suspects														Report Totals	
	<5 yr		5-14		15-24		25-44		26-60		>60		Total	Report	Totals	
	Lk	Pr	Lk	Pr	Lk	Pr	Lk	Pr	Lk	Pr	Lk	Pr	LK	Pr	App	Non App
Feb 2023	0	0	0	0	0	0	2	1	0	0	0	0	2	1	3	0
Mar 2023	0	0	2	1	2	1	3	4	0	0	0	0	7	6	13	0
Apr 2023	0	1	8	2	0	1	0	0	0	1	0	1	8	6	14	0

Table 2: Respondent homogeneity test.

Variable	Intervention		Control		F
	Mean ± SD	Min-Max	Mean ± SD	Min-Max	
Knowledge	86,80±7.23	68 - 100	76,53±5.04	61 - 86	0,001
Attitude	68,75±8,21	50 - 100	65,85±5,43	50 - 78,57	0,000
Action	68.75±8,21	55 - 85	64,95±3,73	55-75	0,000

Exp: p value a,b,c sdtest

Table 3: Analysis of changes in respondents' knowledge, attitudes and actions after intervention.

Attributes of Surveillance	Group Intervention	Control Group	p-value
1. Knowledge			
Before	65,61±5,55	65,32±5,45	0,736**
After	86,42±7,75	75,71±4,25	0,000**
p-value	0,000*	0,000**	
Difference	20,82	10,39	0,000
2. Attitude			
Before	68,75±8,21	65,85±5,43	0,003**
After	87,86±8,58	80,64±8,33	0,000**
p-value	0,000**	0,000*	
Difference	17,00	14,79	0,000*
3. Action			
Before	68,75±8,21	64,95	0,002**
After	83,45±9,68	68,15	0,000**
p-value	0,000**	0,000**	
Difference	14,7	3,3	0,000**

Exp: Δdifference *paired t-test **Wilcoxon

Analysis of changes in respondents' behavior after using educational applications and early detection of leprosy (SI-DINI)

Based on table 2, the analysis of changes in the behavior of respondents after using educational applications and surveillance for early detection of leprosy (SI-DINI) is as follows:

Knowledge: The average knowledge of respondents in the treatment group (SI-DINI Application) before the intervention was 65.61 points; after the intervention, it was 86.42 points. There was an average increase of 20.83 points in the treatment group after the intervention, with a p-value of 0.000. So, it is known that there is a difference in the average knowledge of respondents before and after the intervention in the treatment group.

The average knowledge of respondents in the control group (form) before the intervention was 65.32 points, and after the intervention was 75.71. There was an average increase of 10.39 points in the control group with a p-value of 0.000. So, it is known that there are differences in the average knowledge of respondents before and after the intervention in the control group.

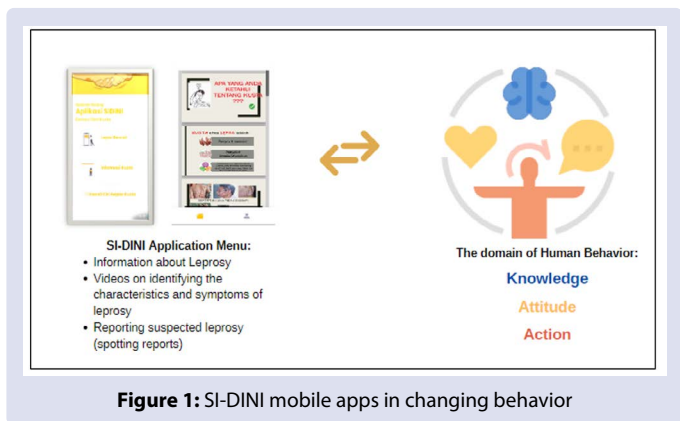


Figure 1: SI-DINI mobile apps in changing behavior

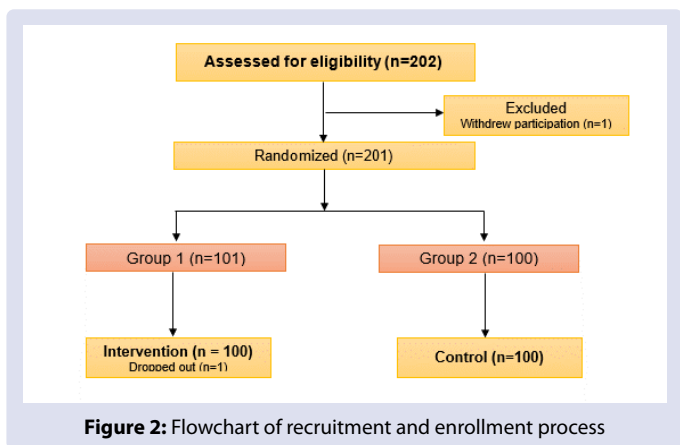


Figure 2: Flowchart of recruitment and enrollment process

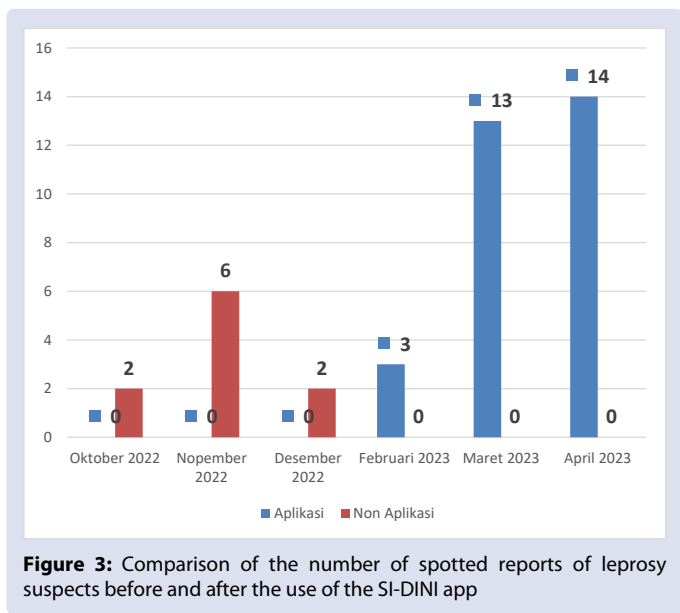


Figure 3: Comparison of the number of spotted reports of leprosy suspects before and after the use of the SI-DINI app

After the intervention, the difference in the mean knowledge of the treatment group and the control group has a significance of <0.05 , which is 0.000, so the null hypothesis is rejected. Statistically, the average increase in knowledge in the treatment group was greater than in the control group, and it could be interpreted that the use of the SI-DINI application affected changes in the respondents' knowledge about leprosy.

Attitude: The mean attitude of the respondents in the treatment group (SI-DINI Application) before the intervention was 68.75, and after the

intervention was 87.86. There was an average increase of 17.00 points in the treatment group after the intervention, with a p-value of 0.000. So it is known that there are differences in the average attitude of respondents before and after the intervention in the treatment group.

The mean attitude of the control group (form) was 65.86, and after the intervention was 80.64. There was an average increase of 14.79 points in the control group with a p-value of 0.000. So it is known that there are differences in the average attitude of respondents before and after the intervention in the control group.

After the intervention, the difference in the mean attitude of the treatment group and the control group has a significance of > 0.05 , which is 0.000, so the null hypothesis is rejected. There was an increase in attitude in the two groups of respondents. Statistically, there was a difference in the average increase in attitude in the two groups, and it could be interpreted that the use of the SI-DINI application affected the mean change in the attitude of the respondents.

Action: The mean action of the respondents in the treatment group (SI-DINI Application) before the intervention was 68.75, and after the intervention was 83.45. There was an average increase of 14.7 points in the treatment group after the intervention, with a p-value of 0.000. So it is known that there is a difference in the average respondent's actions before and after the intervention in the treatment group.

The mean action of the control group (form) was 64.95, and after the intervention was 68.15. There was an average increase of 3.3 points in the control group with a p-value of 0.000. So it is known that there are differences in the average knowledge of respondents before and after the intervention in the control group.

After the intervention, the mean difference between the treatment group and the control group has a significance of <0.05 , which is 0.000, so the null hypothesis is rejected. Statistically, the average increase in activity in the treatment group was greater than in the control group, and it could be interpreted that the use of the SI-DINI application affected changes in respondents' actions on leprosy.

DISCUSSION

DINI mobile app (an education and early detection of leprosy app) in leprosy spotting reporting

The discovery of leprosy with the old method was generally through active surveillance with periodic visits to the community. In this way, the achievement of case-finding rates, including reports of spotting with suspicion of leprosy, tends to remain the same. This manual reporting system also results in low feedback on leprosy services in the community. Sometimes there are even delays. Using the right information system to integrate the right policies and procedures supports health management implementation, including in reporting leprosy.¹⁴

This study found that using the application could increase public awareness to report their health condition early if there were spots they suspected were leprosy. Trials conducted on 100 respondents by introducing the SI-DINI Application within three months were able to increase the number of spotting reports from an average of 3 cases per month to an average of 10 cases per month, which means there was an increase in the findings of leprosy suspicious spots up to 233.33%.

These results align with another study in 2017 which stated that expert systems are very suitable and useful for chronic infectious diseases.¹⁵ Wirasbawa' research (2022) revealed results that were in line with their research on early detection of tuberculosis using a web-based application that made case finding faster and more accurate in its implementation.¹⁶ Other research on the effectiveness of early detection

in handling NTD cases in Ivory Coast also found similar results, where the use of an Android application was associated with program success and an increase in reports of leprosy cases (p-value 0.00).¹⁷

Changes in respondents' knowledge after using the SI-DINI app

Knowledge determines how society responds to sufferers. Stigma often occurs due to people's low understanding of the disease.¹⁸ Knowledge is also needed to handle leprosy so that people understand how to carry out early detection and action, including when and how to contact officers. Educational points that are minimally known include how to do self-detection with temperature sensitivity and knowing the basic differences between leprosy and similar skin diseases.¹⁹

This study found a difference in the average knowledge of the treatment respondent group with the SI-DINI application and the control group after the intervention, with a p-value of 0.000. These results align with research stating that the use of applications is effective for increasing knowledge.¹⁷ Other studies have also revealed that lack of knowledge is a cause of leprosy (p-value 0.02) and a cause of transmission of cases (p-value 0.02).²⁰

Changes in respondents' attitude after using the SI-DINI app

Changes in attitudes in a community or society can occur if attitudes result from learning, so changes can occur if there is an influence of learning in social groups or individuals receiving changes in information. This condition also applies to public health behavior. In social psychology, change is caused by cognitive, affective, and behavioral components.¹¹ Another study in India stated that individual attitudes towards leprosy were influenced by the knowledge they had.²¹

This study found differences in attitude changes between the treatment and control group respondents (p-value 0.000) after educational interventions using the SI-DINI application. So, using the SI-DINI App is not related to changes in attitudes towards lepers.

This finding is in line with the results of research on the use of applications and the level of knowledge of integrated wise government for changing people's behavior in West Java which states that education using Android App is effective for changing individual attitudes.²²

Changes in respondents' action after using the SI-DINI app

Green's theory of change in action (2001) states that individual actions regarding health are determined by three groups of factors, namely predisposing factors, which include knowledge, attitudes, beliefs, values, and perceptions, which motivate a person to act.²³ The second is the enabling factor, including the ability to access the availability of facilities and resources. The last is the reinforcing factor, namely support for action from the social environment, such as health workers. All of these components are expressed as a behavior. Notoatmodjo in his book writes that village community behavior is an activity or activity of a group of individuals, which can be observed directly or not observed by parties outside the group.¹¹ According to Prihantini's research (2018), knowledge is the reinforcing variable that influences individual behavior.²⁴ The number of individuals who change behavior will increase with increasing knowledge.²⁵

This study found a significant change in the respondents' actions in the treatment group after using educational applications and surveillance for early detection of leprosy (SI-DINI). Likewise, when compared to the two groups of respondents, a higher increase was found in the treatment group than the control with a p value of 0.000.

These results align with previous research stating that education can increase knowledge and result in changes in the actions of individuals with leprosy.²¹ Similar results were expressed by Indian researchers who stated that 54.7% of individuals responded positively to individuals with leprosy have adequate knowledge about the disease.²⁶ Another corroborating result is research in West Java which states that using educational applications can increase people's behavior change to be more positive.²⁷

CONCLUSION

The use of the SI-DINI App has been proven effective in changing people's behavior in terms of knowledge, attitudes and actions. There is a significant increase in the knowledge aspect with p-value = 0.000, the attitude aspect p-value = 0.0093, and the action aspect p-value = 0.000. It is hoped that with this research, the government, health agencies and the public will consider the use of education and surveillance applications for early detection of leprosy (SI-DINI) in a more extensive scope and be used sustainably and in the future, it is necessary to improve and develop applications so that they provide more benefit.

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