The Effect of Health Literacy using Digital Media on the Knowledge of Parents of Toddlers in Preventing the Transmission of Childhood Tuberculosis in Bunguran Timur Sub-District, Natuna District

Jaya[1], Muhammad Syafar[2], Suriah[3], Shanti Riskiyani[4], Abdul Salam[5]*

[1, 2, 3, 4] *Master of Public Health Science Study Programme, Faculty of Public Health, Hasanuddin University, Indonesia.*

[5]*Department of Nutrition Science, Faculty of Public Health, Hasanuddin University, Indonesia.*

Abstract

The large number of child TB cases in Natuna Regency indicates the ongoing transmission of TB germs in the community. To assess the effect of health literacy using digital media on the knowledge of parents of children under five in preventing TB transmission in Bunguran Timur Sub-district, Natuna Regency. This study is a quantitative study with a *pre* and *post-test quasi-experimental* design *with control group*. The total sample was 86 people who were divided into two groups. 43 people received education through "RUANG LAKSAMANA" developed through the *Glide Application* and 43 people received education through *WhatsApp* groups. Bivariate analysis used *Paired Sample T Test, Wilcoxon Rank Test* and *Mann-Withhey* test. Multivariate analysis used *logistic regression*. The study showed a significant increase in knowledge about preventing childhood TB transmission through health literacy using the "RUANG LAKSAMANA" application. The percentage of respondents with high knowledge increased from 46.51% to 100.00% in the intervention group and from 41.86% to 100.00% in the control group. Further analysis showed that before the intervention, there were still respondents with low knowledge, but after the intervention, the number of respondents who answered incorrectly decreased significantly. In addition, the results also showed that the dimensions of health literacy (access, understanding, judgement, application) simultaneously had a significant effect on knowledge, with a p value of <0.05. Health literacy using the "RUANG LAKSAMANA" has a significant effect on knowledge.

1. Introduction

Tuberculosis (TB) is a chronic infectious disease caused by the bacterium Mycobacterium tuberculosis, spread through sputum droplets. Children aged 0-14 years are susceptible to infection. Currently, an estimated 9.9 million people worldwide are infected with TB, including 1.1 million children under 15, with 30 countries reporting uncontrolled spread [1]. The Indonesian Ministry of Health recorded 503,712 TB cases from January to November 2022, with 61,594 cases in children. These comprised 34,615 children aged 0-5 years and 26,979 children aged 5-14 years. Transmission occurs mainly due to contact with adults with TB, as well as other risk factors such as nutrition and the environment [2]. According to the 2021 Riau Islands Province Health Profile Data, the number of paediatric TB cases was 436 and Natuna Regency only reported 2 cases.

However, in the last 2 years, based on the Natuna Regency Health Profile Report in 2022, the number of child TB transmission in Natuna Regency has increased significantly, namely 30 cases. This number has increased significantly compared to the previous year, which was only 2 cases [3]. In the third quarter of 2023, child TB transmission in Natuna Regency increased. Data as of September 2023 showed that 47.48% of the 139 new TB cases were children. Of the 66 children treated, 38 were aged 0-4 years and 28 were aged 5-14 years, with 43 cases located in Bunguran Timur sub-district [4]. A preliminary study at the Natuna Regency Hospital found 13 paediatric TB patients whose transmission history was contact with TB patients, while 38 other paediatric TB patients had no known transmission history. Sources of transmission of childhood TB are quite diverse, including grandparents, parents, caregivers, cousins, and other TB patient contacts [5]. Prevention programmes are needed to provide health literacy to the community, especially families with children under five, to reduce the transmission of TB in children [6].

Preventive behaviour for pulmonary TB is crucial to reduce the incidence of TB. Parents need to be educated about the factors that influence their behaviour to prevent TB transmission from the patient to their children [7]. This is important so that they can access, understand, assess and apply the information provided. These factors include self-efficacy, knowledge, attitudes, health education, practices, perceptions, family support, and pre-illness behaviour [8]. One of the factors that influence the incidence of childhood tuberculosis is parental knowledge [9]. Health literacy enables individuals to understand and apply health information [10], yet a study at Bandarhajo Health Centre showed a lack of parental understanding of childhood pulmonary TB, while interviews at Ranai Health Centre highlighted low parental awareness and knowledge, with some families aware of their child's TB condition but reluctant to seek treatment [11]. Another study found that health literacy in pulmonary TB patients was lower in males and males underutilised health facilities [12].

TB prevention behaviour is associated with health literacy, with people with higher health literacy exhibiting better preventive behaviour. Knowledge of TB was lowest on TB symptoms, and self-care behaviour was lowest on examination and drug consumption. Therefore, it is important to improve health literacy in health promotion programmes to improve preventive behaviour [13]. Strengthening health education programmes is necessary to increase community awareness about TB. Health literacy is an important factor in improving disease prevention behaviour. According to Nutbeam (2000), health literacy includes the ability to access, understand, and use health information effectively [14]. The development of digital technology, as reported by Lee & Raviglione (2020) and Xie et al. (2021), have provided new opportunities in the dissemination of health information. Studies show that digital health literacy can promote more positive health behaviours and knowledge about health, especially among adults and university students [15-16].

2. Materials and Methods
2.1. Methodology

This study used a quantitative approach with a quasi-experimental pre and post-test with control group design. The purpose of this design was to evaluate the effect of a digital education intervention on health literacy and parental behaviour in preventing childhood TB transmission. The study was conducted in Natuna Regency, specifically in the working area of Puskesmas Ranai, Bunguran Timur District, from December 2023 to February 2024. The study population included all parents of toddlers in the working area of Puskesmas Ranai who had a minimum level of independent digital health literacy (e-heals) based on preliminary studies in September 2022. The sample was taken using purposive sampling technique with a total of 43 people for the intervention group and 43 people for the control group.

Inclusion criteria included readiness to be a research sample, age 19-45 years, ability to read, have an Android mobile phone with internet data package, and have an active WhatsApp number. A questionnaire was used to measure variables such as digital health literacy, TB health literacy, knowledge, perception, attitude, self-efficacy, practice, stigma, and family support. This questionnaire was modified from various existing sources. Data were collected through questionnaires completed by respondents before and after the intervention. The intervention was delivered through two digital platforms: Glide App for the intervention group and WhatsApp Group for the control group.

Data processing was carried out using SPSS with the stages of editing, coding, entry, and tabulating. Data analysis included validity and reliability tests, univariate analysis, bivariate analysis with Paired T-test and Wilcoxon signed ranks test, and multivariate analysis using logistic regression. This study was conducted after obtaining permission and ethical recommendations with number: 5909/UN4.14.1/TP... From authorized institutions, ensuring the protection of participants' rights and data confidentiality. This study focused on comparing the effectiveness of two digital media in improving health literacy and behavior change of parents of children under five in preventing childhood TB transmission. The results of this study are expected to provide insights and practical recommendations for similar health interventions in the future.

3. Results and discussion
3.1. Results
3.1.1. Characteristics of respondents

Table 1. shows that in the control group and intervention group, female gender was higher than male, with 90.7% and 97.7% respectively. In addition, the age range of the respondents ranged from 19 to 48 years old, with the majority in the age range of 29-38, namely 62.8% of the control group and 53.5% of the intervention group. In terms of education, the majority of respondents in the intervention group had a bachelor's degree, at 34.9%. The control group, on the other hand, mostly had a high school educational background, totalling 41.9%. Regarding employment, most respondents in the intervention group worked as civil servants, reaching 41.9%. Whereas in the control group, the majority were housewives, totalling 65.1%. In terms of mobile phone usage, respondents in the intervention group and control group had generally been using mobile phones for more than 10 years, with 32.6% and 34.9% respectively. Finally, in terms of monthly income, respondents in the intervention group had an income in the range of 1 to 5 million rupiahs (76.7%), while in the control group, the majority had an income below 1 million rupiahs (58.1%).

Table 2. Shows the increase in knowledge in both groups before and after the intervention. The number of respondents in the intervention group who had high knowledge before the intervention was 46.51%, which increased to 100.00% after the intervention. Meanwhile, the number of respondents in the control group who had high knowledge before the intervention was 41.86%, which increased to 100.00% after the intervention. In Table 3 above, it can be seen that before the intervention, there were still respondents who had low knowledge, both in the intervention group and in the control group. The highest number of respondents who answered incorrectly was in question number 9 related to "Children who have symptoms of weight loss or weight gain in the last 2 months, cough for more than 2 weeks, and fever for more than 2 weeks do not need to be immediately examined directly at the Puskesmas" was the first highest number of respondents in both groups who answered incorrectly.

Before the intervention, 76.74% in the intervention group and 79.07% in the control group answered incorrectly. However, after the intervention, the number of respondents

answering incorrectly decreased, namely 4.65% in the intervention group and 25.58% in the control group. The second highest number of respondents answering incorrectly in both groups before the intervention was question number 2 related to "What are the causes of pulmonary TB disease", which was 79.07% in the intervention group and 69.77% in the control group. After the intervention, the number of respondents answering incorrectly decreased by 11.63% in both the intervention and control groups. Furthermore, the most common incorrect answer was question number 10 related to "improved nutrition for children does not affect the prevention of pulmonary TB disease in children", which was 53.49% in the intervention group and 55.81% in the control group. After the intervention, the number of respondents answering incorrectly decreased, with 11.63% in the intervention group and 37.21% in the control group. Table 4. above explains that the results of the *Wilcoxon* test in the intervention group showed a significant difference between knowledge before and after the intervention, with an average increase from 65.35 to 97.21 and a *p-value of* 0.000. Meanwhile, the control group also showed an average increase from 62.56 to 91.40 with a *p-value of* 0.000. Therefore, it can be concluded that there is a significant difference in knowledge between the *pre-test* and *post-test* in both groups. Based on the *Mann Whitney* test between groups, it was found that before the intervention there was no significant difference, with a *p-value of* 0.252 > 0.05. However, after the intervention, a significant difference was found between the two groups, with a *p-value of* 0.000 < 0.05. This indicates that there is a significant difference between the two groups before and after the intervention.. Table 5 explains the results of the logistic regression test in the intervention group through "RUANG LAKSAMANA" showing that simultaneously the four dimensions of health literacy, namely the ability to access, the ability to understand, the ability to assess and the ability to apply, have a significant effect on knowledge, where all values are p<0.05. However, partially, the test results showed that not all dimensions of health literacy had a significant influence on knowledge. The influential dimensions are the ability to understand p=0.012 and the ability to judge p=0.019

3.2. Discussion

The development of health literacy through digital media is related to the level of digital literacy of parents of children under five. As stated by Longo, e-health positively influences individuals' health information seeking behaviour, which in turn affects health outcomes [17]. Digital health literacy in this study was measured using the e-heals instrument, which consists of 8 statements with a scale of 4, namely strongly disagree (score 1), disagree (score 2), agree (score 3), and strongly agree (score 4). As stated by Sjamsuddin & Anshari (2023), the e-heals questionnaire can assess an individual's knowledge, comfort, and skills in finding, evaluating, and applying electronic health information for health problems [18]. Of the 8 questions, the majority of respondents in both the intervention and control groups disagreed or strongly disagreed with the statement "I feel confident to use information from the internet to make decisions about health." The number reached 67.4% in the intervention and control groups.

This figure reached 67.4% in the intervention group and 58% in the control group who disagreed. From these results, it can be concluded that before the intervention, most respondents still felt less confident in using information from the internet for their health decisions, in line with previous research [19]. These results are in line with the results of Olayemi and Abolarinwa's study (2023), which stated that although the majority of respondents had mobile phone devices to access e-health information, as many as 73.3% of them did not have the skills to evaluate health resources on the internet, and they had difficulty distinguishing between high and low quality resources [20]. This leads to a lack of confidence in using information from the internet. Based on the results stated previously, it is concluded that media is needed as a tool or means for internet-based communication, such as smartphones or computers, which can be used for learning for the community. This media can stimulate people's thoughts, attention and motivation in accessing and interpreting information. Etymologically, media comes from Latin, which is the plural form of the word "medium" which means "middle, intermediary, or introduction".

The term intermediary or introducer, according to Bovee in Asyhar (2011), is used because the media functions as an intermediary or introducer of a message from the sender (sender) to the receiver (receiver) of the message [21]. Media is anything that can be used to channel messages to recipients so that it can stimulate students' thoughts, feelings, attention, and interests and attention in such a way that the learning process occurs [22]. Digital media is one of the gadgets in new media. In the book Communication and Commodification, the definition of new media is explained (Dennis McQuail, 2000 in Ibrahim and Akhmad, 2014), there are four main categories, namely interpersonal communication media such as email, interactive media such as games, information search media such as search engines on the Net and participatory media such as chat rooms on the Net [23]. In this study, the media for health literacy intervention on preventing childhood TB transmission was conducted through an application called "Ruang Literasi Kesehatan Masyarakat Natuna," abbreviated as "RUANG LAKSAMANA." This application was developed using Glide (Glideapps) which can be downloaded for free. The features available in Glide are very complete, allowing the application to be developed to be rich in features and content.

The development of media literacy through Glide is done because Glide is one of the internet-based digital media that is easy to use without requiring any coding or programming knowledge. Glide converts data from a spreadsheet into a special application with templates and features for customisation [24]. The media that has been developed is then evaluated by material experts and media experts to assess its feasibility. The media expert gave a perfect assessment with a score of 100%, indicating that the media was ready to use. The material expert also gave the same assessment, indicating that the application is very suitable for further development. Based on the evaluation that has been done, it can be concluded that this media qualifies as an information tool that is feasible to implement [25]. The results showed that before the intervention, some respondents in both groups had low knowledge. However, after the intervention, the number of respondents with high knowledge increased in both groups. In addition, the Wilcoxon test showed a significant increase in knowledge after the intervention in both groups.

Table 1. Distribution of Respondents in 2024

Characteristics Respondents	Intervention Group		Control Group		Total	
	n	%	n	%	n	%
Gender						
Male	4	9,3	1	2,3	5	5,8
Women	39	90,7	42	97,7	84	94,2
Total	**43**	**100**	**43**	**100**	**86**	**100**
Age						
19 -28	12	27,9	14	32,6	26	30,2
29 - 38	27	62,8	22	51,2	49	57,0
39 - 48	4	9,3	7	16,3	11	12,8
Total	**43**	**100**	**43**	**100**	**86**	**100**
Education						
SD	3	7,0	6	14,0	9	10,5
SMP	4	9,3	3	7,0	7	8,1
SMU	9	20,9	18	41,9	27	31,4
D III	12	27,9	8	18,6	20	23,3
S1/DIV	15	34,9	7	16,3	22	25,6
S2	0	0	1	2,3	1	1,2
Total	**43**	**100**	**43**	**100**	**86**	**100**
Jobs						
ASN	18	41,9	7	16,3	25	29,1
Non ASN	7	16,3	4	9,3	11	12,8
Wirawasta	3	20,0	4	9,3	5	5,8
IRT	15	34,9	28	65,1	45	52,3
Total	**43**	**100**	**43**	**100**	**86**	**100**
Lama Using the Phone						
<5 Years	2	4,7	3	7,0	5	5,8
5-10 Years	14	32,6	15	34,9	29	33,7
>10 Years	27	62,8	25	58,1	52	60,5
Total	**43**	**100**	**43**	**100**	**86**	**100**
Revenue in 1 Month						
<1 Million	9	20,9	25	58,1	34	39,5
1-5 Million	33	76,7	17	39,5	50	58,1
>5 Million	1	2,3	1	2,3	2	2,3
Total	**43**	**100**	**43**	**100**	**86**	**100**

Source: Primary Data, (2024)

Table 2. Knowledge before and after the interventionIn Both Groups in 2024

Knowledge Category	Group							
	Intervention				Control			
	Pre Test		Post Test		Pre Test		Post Test	
	n	%	n	%	n	%	N	%
Low	23	53,49	0	0	25	58,14	0	0
High	22	46,51	43	100	18	41,86	43	100
Total	**43**	**100**	**43**	**100**	**43**	**100**	**43**	**100**

Source: Primary Data (2024)

Table 3. Distribution of Respondents Based on Answers on Measurement Knowledge in 2024

Question	Activities	Answer	Group Intervention		Control	
			n	%	N	%
1. What is pulmonary TB?	Pre test	Wrong	1	2,33	9	20,93
		Correct	42	97,67	34	79,07
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	0	0
		Correct	43	100,00	43	100,00
	Total		**43**	**100**	**43**	**100**
2. What causes pulmonary TB disease?	Pre test	Wrong	34	79,07	30	69,77
		Correct	9	20,93	13	30,23
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	5	11,63	5	11,63
		Correct	38	88,37	38	88,37
	Total		**43**	**100**	**43**	**100**
3. Pulmonary TB is a non-communicable disease	Pre test	Wrong	9	20,93	20	46,51
		Correct	34	79,07	23	53,49
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	2	4,65
		Correct	43	100,00	41	95,35
	Total		**43**	**100**	**43**	**100**
4. Pulmonary TB only occurs in adults	Pre test	Wrong	13	30,23	9	20,93
		Correct	30	69,77	4	79,07
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	0	0
		Correct	43	100,00	43	100,00
	Total		**43**	**100**	**43**	**100**
5. What are not symptoms of childhood TB are	Pre test	Wrong	16	37,21	17	39,53
		Correct	27	62,79	16	60,47
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	1	2,33
		Correct	43	100,00	42	97,67
	Total		**43**	**100**	**43**	**100**
6. Pulmonary TB disease in children can be prevented with the following exceptions	Pre test	Wrong	5	11,63	8	18,60
		Correct	38	88,37	35	81,40
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	0	0
		Correct	43	100,00	43	100,00
	Total		**43**	**100**	**43**	**100**
7. Children in direct contact with adult TB patients are at risk of contracting TB	Pre test	Wrong	13	30,23	8	18,60
		Correct	30	69,77	35	81,40
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	2	4,65
		Correct	43	100,00	41	95,35
	Total		**43**	**100**	**43**	**100**
8. A good home environment for the prevention of pulmonary TB is	Pre test	Wrong	2	4,65	2	4,65
		Correct	41	95,35	41	95,35
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	0	0	0	0
		Correct	43	100,00	43	100,00
	Total		**43**	**100**	**43**	**100**
9. Children with symptoms of weight loss or no weight gain in the last 2 months, cough for more than 2 weeks and fever for more than 2 weeks do not need to be seen immediately at the health centre.	Pre test	Wrong	33	76,74	34	79,07
		Correct	10	23,26	9	20,93
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	2	4,65	11	25,58
		Correct	41	95,35	32	74,42
	Total		**43**	**100**	**43**	**100**
10. Improved child nutrition has no effect on the prevention of pulmonary TB in children	Pre test	Wrong	23	53,49	24	55,81
		Correct	20	46,51	19	44,19
	Total		**43**	**100**	**43**	**100**
	Post test	Wrong	5	11,63	16	37,21
		Correct	38	88,37	27	62,79
	Total		**43**	**100**	**43**	**100**

Source: Primary Data (2024)

Table 4. Average Knowledge of Respondents on Second Group of 2024

Group	Pre-Test Mean ± SD	Post Test Mean ± SD	*P Value*
Intervention	65,35 ± 14,69	97,21 ± 6,66	0.000[*]
Control	62.56 ± 20.59	91.40 ± 8,61	0.000[*]
P value	0.252[**]	0.000[**]	

Source: Primary Data, (2024)
*Notes: * Wilcoxon test, ** Mann Whitney test*

Table 5. The Effect of Health Literacy Dimension on Knowledge, Perception, Attitude, Efficacy, Practice, Stigma and Family Support in the Intervention Group

Simultaneous Influence		
Independent variables	**Dependent Variables**	**Pre-Post Test**
Accessibility Ability, Understanding Ability, Assessment Ability and Implementing Ability	Knowledge	0,000
Z		
Independent variables	**Variabel dependen**	**Pre-Post Test**
Accessibility Ability	Knowledge	0,663
Understanding Ability		0,012
Assessment Ability		0,019
Implementing Ability		0,239

Source: Primary Data, (2024)

Furthermore, the Mann Whitney test showed that there was no significant difference between the two groups before the intervention, but there was a significant difference after the intervention. This shows that the intervention is effective in increasing knowledge in both groups. These results are in line with the research of Latif & Tiala (2022), which showed that the mean and min-max values in the intervention group (2.93) were higher and significant than in the control group (1.27). Furthermore, the results of the Mann-Whitney test in the pre-post of the intervention group showed a p-value of 0.001, and the pre-post of the control group showed a p-value of 0.003, which means that there was a significant influence after being given educational actions through videos or through leaflets in WhatsApp groups [26]. Likewise, a study conducted by Irfan (2020), which saw the influence of smartphone-based video tutorials on increasing family knowledge and attitudes in caring for Daily Living Activities (ADL) of patients with mental disorders in the Majene Regency Health Center Work Area.

This study found the results of the difference in the average knowledge score before and after the intervention in the control group and treatment by conducting an Independent T Test analysis which showed that there was a

significant difference in the two final measurement results with a p-value of 0.000 [27]. Furthermore, there is a study by Qotrunnada (2022), which concluded that based on the results of the marginal homogeneity test, the application of SINUCA_DM has an effect on increasing the knowledge of people with diabetes mellitus about nutrient needs, with a p-value of 0.000 [28]. Similar findings were also achieved by Hardini & Barmawi (2022), who examined the influence of the ICT-based education model "Application Teradam" on parental knowledge in child emergency management. The results showed that there was a significant effect with a p < value of 0.05 based on the analysis of the Paired T Test [29]. Another study by Lundy, Suryani & Halis (2022), which observed the effect of E-Book educational applications in the prevention of Diabetes Mellitus Type II (DMT II) in adolescents in the era of the Covid-19 pandemic, also showed the results of the Wilcoxon test with a p-value of < 0.001, which indicates a significant change between before and after the treatment of knowledge with the provision of education using e-book applications [30].

In this study, the group that received education through "RUANG LAKSAMANA" had a higher average increase difference compared to the group that received

education through WhatsApp groups. Thus, it can be concluded that in increasing knowledge, intervention through "RUANG LAKSAMANA" is more effective than intervention through WhatsApp groups. This can be affected by the higher frequency and intensity of watching and viewing media in the Glide group than in the WhatsApp group. According to Benjamin Bloom (1908) in Notoatmodjo (2011), knowledge is the result of human sensing, or the result of a person's knowledge of objects through the senses they have (such as eyes, nose, ears, and so on). Thus, the intensity of attention and perception of the object during sensing can affect the results of knowledge obtained [31]. In addition, when comparing the platforms used in both groups, the results showed that the average intensity of media viewing and viewing was higher in the intervention group.

Specifically, videos were watched an average of 34 times, posters were viewed 34 times, and leaflets were read 33 times, while in the control group, videos were watched an average of 25 times, posters were viewed 24 times, and leaflets were read 24 times. These results are in line with research by Isyroofanaa, Faizah & Martono (2019), which concluded that there is an effect of the quality of media exposure (p=0.006) and quantity of mass media exposure (p=0.002) on the level of health literacy [32]. Another difference was the dropout of respondents in the control group during the intervention. There were 3 respondents who dropped out from the control group that received the intervention through the WhatsApp group, while in the group that received the intervention through GlideApp, no respondents dropped out during the intervention.

The difference could be influenced by the advantages and disadvantages of the two platforms. Some of the advantages of Glide are that it is easy to use, provides many features, has an attractive appearance, and can be accessed on desktop, mobile, and tablet to provide a consistent user experience. The downsides are that there is not much room for customisation and there are no in-app notifications, although it is possible to use integrations for email or SMS notifications. Similar to Glide, WhatsApp also has some advantages, such as not requiring a login every time you open the app, immediately connecting with your contacts, saving messages, sharing your location, setting custom wallpapers and notification tones, and being able to send messages to multiple contacts at once (broadcast). The results of the logistic regression test in the intervention group through "RUANG LAKSAMANA" showed that simultaneously the four dimensions of health literacy, namely the ability to access, the ability to understand, the ability to assess and the ability to apply, had a significant effect on knowledge, where all values were p< 0.05.

Partially, the test results in this study show that in the intervention group, there are 3 dimensions, namely the ability to understand, assess and apply, which has a significant effect on variables. Meanwhile, the ability to access has no significant effect. These results are in line with research conducted by Puspita (2024), which showed that access to health information (p=0.392) had no effect on TB prevention behavior in adolescents at SMA N 1 Baturraden [33]. The results of research and literature that specifically conclude that there is a partial influence of the four dimensions of health literacy on the variables studied are very limited. However, from the results of the study, it can then be concluded that to create a health behavior, the four

dimensions of health literacy must exist in every individual. This is based on what was proposed by Sørensen et al. (2012), which stated that health literacy is related to literacy and requires knowledge, motivation and competence to access, understand, assess and apply. These four components are called the health literacy dimension [34].

4. Conclusions

Based on the results of expert validation and product trials, health literacy using digital media in the prevention of childhood TB transmission in Bunguran Timur Subdistrict, Natuna Regency, can be developed through the Glide application (Glideapps) named "Ruang Literasi Kesehatan Masyarakat Natuna," abbreviated as "RUANG LAKSAMANA". The implementation of "RUANG LAKSAMANA" has shown a significant effect on the knowledge of parents of children under five in preventing childhood TB transmission, with a p value of 0.000. In addition, the results also showed that the dimensions of health literacy (access, understanding, judgement, application) simultaneously had a significant effect on knowledge, with a p value of <0.05.

Research Limitations

During the implementation, there were several limitations of the study found by the researcher. Firstly, the monitoring of the frequency and intensity of respondents' access to the media is still done manually. This implies that the intensity of respondents' access to media is not reported in real-time through the application, but through the available logbook. Secondly, the Glide digital platform used to develop the app is a paid service. Consequently, the app development was less than optimal due to limited access to some of the features provided. Finally, implementation can only be done in areas that already have an internet network available.

Conflict of interest: None

References

[1] W.H. Organization. (2013). Global tuberculosis report 2013. World health organization: pp.

[2] Ministery of Health of Republic of Indonesia. (2022). Indoensia health profile 2022. Jakarta: Ministery of health of republic of Indonesia.

[3] Riau Islands Provincial Health Office. (2021). Riau islands province health profile 2022. Tanjung Pinang: Riau islands provincial health office.

[4] Natuna District Health Office. (2022). Natuna regency health profile report 2022. Natuna regency health office.

[5] Natuna District Health Office. (2023). TB report 07. Natuna: Natuna district health office.

[6] Natuna Regency Health Office. (2022). Natuna regency health profile data in 2022. Natuna: Natuna regency health office.

[7] S. Suarnianti, Y. Haskas. (2022). Analysis of the relationship between self efficacy and the incidence of pulmonary Tb at Tamalanrea health centre. HealthCare Nursing Journal. 5(1): 521-8.

[8] F. Anggraini, D.P. Laksana, F. Wulandari. (2021). Health literacy and prevantive behavior towards

childhood pulmonary TB at Bandarharjo health centre. Journal of Health. 9(2): 61-71

[9] M.M.D. Goroh, C.H. van den Boogaard, K.A. Lukman, C. Lowbridge, W.K. Juin, T. William, M.S. Jeffree, A.P. Ralph. (2023). Factors affecting implementation of tuberculosis contact investigation and tuberculosis preventive therapy among children in Sabah, East Malaysia: A qualitative study. Plos one. 18(5): e0285534.

[10] D. Carvalho, C. Sequeira, A. Querido, C. Tomás, T. Morgado, O. Valentim, L. Moutinho, J. Gomes, C. Laranjeira. (2022). Positive mental health literacy: A concept analysis. Frontiers in psychology. 13: 877611.

[11] E.R.L. Tobing, A. Fitria. (2024). Faktor Yang Memengaruhi Kepatuhan Penderita TB Paru Dalam Mengkonsumsi Obat Di UPT Puskesmas Batang Beruh Kecamatan Sidikalang Kabupaten Dairi. Journal of Educational Innovation and Public Health. 2(1): 254-268.

[12] A.Y. Lelewana, I.R. BN. (2024). Determinants of treatment-seeking behaviour in patients with pulmonary TB at Tsmalanrea puskesmas JIMPK: Scientific Journal pf Nursing Students & Research. 4(2):142-51

[13] A.S. Kasa, A. Minibel, G.M. Bantie. (2019). Knowledge, attitude and preventive practice towards tuberculosis among clients visiting public health facilities. BMC research notes. 12: 1-6.

[14] D. Nutbeam. (2000). Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. Health promotion international. 15(3): 259-267

[15] S. Lee, V. Rajaguru, J.S. Baek, J. Shin, Y. Park. (2023). Digital health interventions to enhance tuberculosis treatment adherence: scoping review. JMIR mHealth and uHealth. 11(1): e49741.

[16] L. Xie, S. Zhang, M. Xin, M. Zhu, W. Lu, P.K.-H. Mo. (2022). Electronic health literacy and health-related outcomes among older adults: A systematic review. Preventive medicine. 157: 106997.

[17] D.R. Longo. (2005). Understanding health information, communication, and information seeking of patients and consumers: a comprehensive and integrated model. Health expectations: an international journal of public participation in health care and health policy. 8(3): 189.

[18] H. Sjamsuddin, M. Anshari. (2023). Evaluation of the application of the E-Heals questionnaire in research on the level of digital health literacy among parents with toddlers. J Kesehat Masy. 8(2): 142-9.

[19] A. Olayemi, O. Abolarinwa. (2023). Utilisation of E- Health resources and health literacy among parents in Lagos, Nigeria. J Health Inf Literacy. 3(1): 27-35.

[20] R. Asyhar. (2011).Communication and commodification. Jakarta: Kencana.

[21] P. Redi. Judul: Politics of film needed by national film industry in indonesia.

[22] D. McQuail. (2010). McQuail's mass communication theory. Sage publications: pp.

[23] I.S. Ibrahim, B.A. Akhmad. (2014). Komunikasi dan komodifikasi: Mengkaji media dan budaya dalam dinamika globalisasi. Yayasan Pustaka Obor Indonesia: pp.

[24] U. Frank, P. Maier, A. Bock *Low code platforms: Promises, concepts and prospects. A comparative study of ten systems*; ICB-Research Report: 2021.

[25] A.A. Supardi, Y. Gusmania, F. Amelia. (2019). Development of mathematics learning module based on constructivism approach on logarithm material. AKSIOMA: J Mathematics and Mathematics Education. 10(1):80-92

[26] A.I. Latif, N.H. Tiala. (2022). The effectiveness of educational videos through Whatsapp in increasing knowledge about the prevention of transmission of pulmonary tuberculosis patients. *Jurnal Kesehatan*, 14(2): 111-115.

[27] I. Irfan. (2020). The Effectiveness of smartphone-based video tutorials on increasing family knowledge and attitudes in caring for daily living activities (ADL) of patients with mental disorders.

[28] N. Qotrunnada. (2022). Pengaruh Pendidikan Kesehatan Melalui Aplikasi SINUCA_DM Terhadap Pengetahuan Tentang Kebutuhan Nutrien Pada Penderita Diabetes Melitus. Journal of Borneo Holistic Health. 5(1): 10-18.

[29] D.S. Hardini, S.R. Barmawi. (2022). The Effect of ICT-Based Education Model on Parental Knowledge in Child Emergency Management. Basicedu Journal. 6(1): 1006-1018.

[30] F. Lundy, P. Suryani, F. Halis. (2022). The Effect of E-Book educational applications in the prevention of diabetes mellitus type II (DMT II) in adolescents in the Covid 19 Pandemic Era. *Jurnal Informasi Kesehatan Indonesia* (JIKI). 8(2): 190-201

[31] S. Notoatmodjo. (2011). Public Health: Science & Art. Revised Edition. Rineka Cipta. Jakarta

[32] N. Isyroofanaa, R. Faizah, H. Martono. (2019). The Effect of quality and quantity of mass media exposure on the health literacy level of exposure on the health literacy level of Adolescents in Surabaya. J Komun Kesehat. 5(2): 78-85.

[33] A.D. PUSPITA. (2024). The Effect of health literacy on tuberculosis prevention behavior in Adolescents in *SMA N 1 Baturraden* (Doctoral dissertation, Universitas Jenderal Soedirman).

[34] K. Sørensen, S. Van den Broucke, J. Fullam, G. Doyle, J. Pelikan, Z. Slonska, H. Brand, C.H.L.P. European. (2012). Health literacy and public health: a systematic review and integration of definitions and models. BMC public health. 12: 1-13.