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Effectiveness of Short Message Service Reminder and Counseling of Immunization for Age 18-24 Months

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Abstract

Indonesia now ranks fourth in the world in terms of the largest number of unimmunized children. SMS (Short Message Service) reminders and counseling have been shown to increase outreach, but no research has combined these two interventions. This study aimed to determine the effectiveness of SMS Reminder and Counseling on the knowledge, attitude, and willingness of mothers under five and to find out the factors that influence this willingness. This study used the one-group method, pretest, and posttest design. The samples were 186 children under five (18-24 months) who felt incomplete and mothers who had children under five (control and intervention groups). The Chi-Square test shows significant results during the post-test ($p < 0.05$). The Mc-Nemar test shows the influence of counseling and SMS Reminders on increasing knowledge, attitudes, and willingness ($p = 0{,}000$). The logistic regression test shows the factors that affect the advanced immunization of under two years child, that was sufficient knowledge ($\rho = 0{,}000$; OR = 13,384; CI = 5,986-29,926). SMS Reminders and counseling affect parents' knowledge, attitudes, and willingness. Factors affecting parental willingness to continue immunization are adequate knowledge. Collaboration between officials and health agencies, the community, and cellular operators is needed to implement the training of health workers.

Introduction

Indonesia now ranks fourth in the world in terms of the largest number of unimmunized children (World Health Organization, 2020). The WHO Expanded Programme on Immunization was launched in Indonesia in 1977, and the country currently has a comprehensive multiyear plan for immunization, covering 2015–2019. Basic immunization for children is indicated as part of the minimum standard health services for districts and provinces, as specified in the 2016 Ministry of Health Decree No. 43. Furthermore, the complete basic immunization for children is included in the Healthy Indonesia Programme with Family Approach (Program Indonesia Sehat Dengan Pendekatan Keluarga/PIS-DPK), a recent program to promote health through primary health centers (World Health Organization, 2017). Some of the most effective vaccines are composed of attenuated microbes, which are treated to abolish pathogenicity while retaining their infectivity and antigenicity (Abbas & Lichtman, 2020).

Data from Indonesia in 2018, 66% of districts attained >80% coverage with the third dose of the pentavalent vaccine, while only 17% of districts attained >90% coverage with the second dose of measles-containing vaccine (MCV2). Only 11 (32%) of 34 provinces had more than 95% fully immunized children (World Health Organization, 2020). Most

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locations fell below the 2020 GVAP (Global Vaccine Action Plan) target of achieving at least 90% coverage across vaccines in 2019, signaling the need to further expand the program reach of unvaccinated or under-vaccinated children. In 2019, 75% of zero-dose children lived in 14 countries one of them being Indonesia (Galles *et al*., 2021).

Indonesia, the complete basic immunization indicator had the lowest national average coverage (59.2%). The highest national average coverage was reported for the two indicators that capture a single vaccine dose (BCG at 87.6% and measles at 82.1%), followed by polio (77.0%) and DPT-HB (75.6%) (World Health Organization, 2017). Based on research Chu H in 2022 showed data in 2017, only 5 out of 34 provinces had full immunization rates above 80%, while 11 provinces had full immunization rates below 60% one of them East Java (Chu & Rammohan, 2022). Several outbreaks of diphtheria have occurred in the East Java Province of Indonesia there were 97 diphtheria cases approved by the Diphtheria Expert Committee in 2019. The reports came from 36 of 38 districts. One patient died, denoting a case fatality rate of 1%. The majority were 19 years of age or less, with incomplete immunization (Husada *et al.*, 2020). Cases of diphtheria in 170 regencies or cities in 30 provinces in Indonesia with a CFR of 4.6% in 2017 and 48% of cases of diphtheria came from East Java. Kediri is one of the regencies that was affected by the outbreak in January 2018 and found 19% of toxigenic positive cases from 21 cases of diphtheria until May 2018 (Sari & Shofiya, 2020). Pneumonia disease is the second leading cause of death in children under five after diarrhea. The study with Wati, N *et al* in 2021 concluded the significant relation between immunization status. DPT immunization is one of the effective immunizations to reduce factors that increase mortality from pneumonia (Wati *et al.*, 2021). Immunization status and maternal knowledge are variable factors that influence the occurrence of measles in Indonesia. Parents, especially mothers, need to increase their knowledge of measles and support government programs called measles-rubella immunization to avoid infection with measles (Ramadhani *et al.*, 2023).

This study's tendency is that the low education level is one of the risk factors for the incompleteness of immunization coverage (Hu, 2015; Abebe *et al*., 2019; Choi *et al*., 2017). The other research findings indicate that there is a wide range of inequality in immunization throughout the Indonesia region due to socioeconomic and demographic factors that complete immunization status was significantly associated with the mother's education (Siramaneerat & Agushybana, 2021).

Program innovation using mobile phone short message service is a widely applicable appointment reminder intervention to improve healthcare. The majority of mothers have the intention to use text message reminders for child vaccination. Mother's age and education use were associated with the intention of mothers to use text messages for vaccination. Considering these predictors and user preferences before developing and testing text message reminder systems is recommended (Akinrinade *et al*., 2018; Mekonnen *et al.*, 2021; Yeung *et al*., 2018).

Many previous studies have examined one type of intervention to increase parental awareness of immunization and significantly better routine immunization performance (Choi *et al*., 2017; Hu, Li, and Chen, 2018; Eze & Adeleye, 2015). After achieving large gains in childhood vaccine coverage worldwide, in much of the world this progress was stalled or reversed from 2010 to 2019. These findings underscore the importance of revisiting routine immunization strategies and programmatic approaches, recentring service delivery around equity and underserved populations. Strengthening vaccine data and monitoring systems is crucial to these pursuits, now and through to 2030, to ensure that all children have access to, and can benefit from, lifesaving vaccines (Galles *et al.*, 2021) Therefore, this study was conducted to determine the combined effects of the two interventions (SMS Reminder and counseling) on immunization awareness from mothers in the working area of Mrican Health Center in Mojoroto District, Kediri City. Researching using more than one intervention can help increase parental awareness of immunization, which is one of the Public Health Center programs.

Methods

The types of research used in this study are One group Pretest and Postest Design. The study was conducted in the working area of Mrican Health Center in Mojoroto District, Kediri City in 2020. The sample of this study was under two years child and under two years child mothers whose incomplete immunization status was in the working area of the Mrican Health Center and fulfilled the inclusion and exclusion criteria. Inclusion criteria in the form of under two years child and mothers who are willing to participate in the whole series of research, and mothers with under two years child who have mobile phones and can read. While the exclusion criterion is the mothers with under two years child who are not willing to participate in this research activity, in this study, there were 212 under two years child born in January - September 2018 with details of 26 under two years children that had complete immunization and 186 under two years child with incomplete immunization. The incomplete follow-up immunization referred to in this study is the two-year-old child who has not received DPT-Hb-Hib and measles immunization, measles immunization, or only DPT-Hb-Hib immunization. This study used Total Sampling, which samples the number of under two years people born in January - September 2018. The Children born in the working area of Mrican Health Center covering the villages of Mrican, Gayam, Ngampel, and Dermo, whose immunization status is still incomplete. The population used is the incomplete under two years child status of immunizations born in January-September 2018 is as many as 186 under two years child so that the number of samples of this study is equal to the number. Subsequently, a sample of under two years child born in that month (March 2020) was used because in the month of data collection, even under two years children aged 18-24 months added time opportunity to catch up. The number of samples needed in this study was 186 samples consisting of 2 groups: 93 control groups in which the group was not given counseling and intervention SMS Reminders and the intervention group amounted to 93 samples where in this group the intervention was given in the form of counseling and SMS Reminder. The instruments used in this study were questionnaires, 2019 preschool toddler cohort data, counseling materials in the form of power points, videos, and leaflets regarding the definitions, types, schedules, importance, and KIPI of advanced immunization for children, tabs, and laptops used as a tool for displaying power points and videos. The questionnaire was filled out following the sample data, including identity, age, occupation, and last education. The questionnaire uses thirty-five questions divided into the first fifteen questions about knowledge, the next thirteen questions about attitude, and the last seven questions about willingness. The independent variables assessed by the questionnaire included knowledge variables divided into adequate (values greater than 7.5) and inadequate (values less than 7.5), attitude variables divided into positive (values greater than 48) and negative (values less than 48), and willingness variables which divided into agree (value greater than 24.5) and disagree (value less than 24.5).

The flow of data collection first determines the age of under two years (18-24 months). Initially search for under two years child data which in March 2020 aged 18-24 months then look for under two years child born in January - September 2018 from 2019 cohort book sources. Completeness of immunization data seen using the 2019 and 2020 cohort books. After that, names and home addresses are recorded. Samples that have determined then visited one by one or found during the Integrated Family Planning Health Service activities to be informed whether parents are willing to be respondents, then samples that agree do a pretest, and continue counseling about the definition, type, schedule, importance and KIPI advanced immunization of under two years child by researchers to under two years child mothers (Jaca *et al*., 2018).

Counseling is done individually and face to face. One researcher gave counseling to one respondent using power points and videos that were displayed through electronic media (laptops, tabs) and given leaflets about immunizations. After counseling, the researcher explained to participants have mobile phones and are willing to receive messages the intervention SMS Reminder that will be carried

out by researchers (Akinrinade *et al*., 2018 Jaca *et al*., 2018; Oladepo *et al.*, 2019). Researchers explain the definition of SMS Reminder, its objectives, and methods. After the respondent understands, then the researcher asks for an active mobile number or the number of the closest person at home who often uses a cell phone and is asked to be willing to text

After that, the SMS Reminder is carried out once a day before the schedule for the immunization of the under two-year-old child is carried out. The SMS was sent to mothers with under two years child with the following format by phone in the local language: "Assalamualaikum mom, we are doctors from the Mrican Health Center, we want to remind you, that tomorrow is the time for measles continued immunization for your child, please take your child to the Mrican Health Center tomorrow. Do not forget to bring a pink book or an immunization card. Thanks. Wassalamualaikum" (Eze & Adeleye, 2015; Choi *et al*., 2017; Omoniyi & Williams, 2020). The next day the mothers of the under two years child who came further to immunize their children at the Mrican Health Center then did a post-test. The remaining visits were made to homes to fill out post-tests of advanced immunization counseling and SMS Reminder.

The author has previously passed an ethical review with the health research ethics committee with No.007/26/V/EC/KEPK/Lemb. Candle/2020. The data obtained will be analyzed using the SPSS 23 program. Univariate analysis is used to look at the frequency distribution and percentage of each research variable. Bivariate analysis to see differences in the variables of knowledge, attitudes, and willingness. Bivariate analysis was performed chi-square to determine differences in the pretest of the control group against the pretest of the intervention group, and the post-test of the control group against the post-test of the intervention group. The Mc Nemar test was conducted to determine the effect of counseling and SMS Reminder on knowledge, attitude, and willingness.

Results and Discussion

Based on Table 1, the number of mothers with under two years child aged 18 to 29 is 37 people a year, while more than 30 years old are 49 people. Mothers with under two years child who have a high level of education are 162 people, and those who have low education are 24 people. The work of mothers with under two years child is divided into two, namely working and not working, where 60 people work and the remaining 126 people do not work. The characteristics of respondents at the most are 18-29 years old (73.7%), this is in line with research by Mugada *et al* (2017) India found more respondents aged 21-25 years as many as 190 people (50.39%) (Mugada *et al*., 2017). In the study of Noh J., *et al* (2018) in Sindh City, Pakistan obtained more respondents aged 25-34 were 652 people (52.6%) (Noh *et al*., 2018). For the education level of respondents, most are in tertiary education (≥ high school) (87.1%), this is following research of Choi A. *et al* (2017) at the Korea Cancer Center Hospital found that more mothers had higher education or higher of 466 people (72.9%) and also in line with research Mugada *et al* (2017) in India found more mothers who have higher education levels of 142 people (37.66%) (Choi *et al*., 2017; Mugada *et al*., 2017).

Table 1. Sociodemographic Characteristics of Respondents

	n	%
Age:		
18-29 years	37	73,7%
≥ 30 years	49	26,3%
Education Level:		
High (≥ High School)	162	87,1%
Low (< High School)	24	12,9%
Occupation:		
Working	60	32,3%
Not Working	126	67,7%

(Source: Results Data, 2020)

However, this is different from the research of Noh J., *et al* (2018) where most mothers have no education in Sindh City, Pakistan is 420 people (44.5%) (Noh *et al*., 2018). Most respondents in this study were parents who did not work, as many as 126 people or 67.7%, this is following research conducted by Mugada *et al* (2017) regarding parental reasons for the incompleteness of the immunization status of their children in India, which was obtained more unemployed mothers were 340 people or 90.18% while mothers who

worked were 37 people or 9.18% (Mugada *et al*., 2017). According to Choi A. *et al* (2017), the Korea Cancer Center Hospital found 395 (61.8%) unemployed mothers and 244 (38.2%) working mothers (Choi *et al*., 2017).

To find the relationship between giving treatment with SMS reminders and counseling on knowledge, attitudes, and willingness of mothers with under two years child in advanced immunization of under two years child assessed in the pretest and post-test. A comparative category test was conducted by Mc Nemar in the two control and intervention groups. Based on Table 2, it was found that in the intervention group, the number of mothers with under two years child who had adequate knowledge at the pretest and post-test 25 people and 68 people who initially had inadequate knowledge at the pretest became adequate at the post-test after giving SMS reminder and counseling. Mothers with under two years child in the control group who had adequate knowledge at the time of the pretest and post-test were 23 people. In contrast, those who initially had inadequate knowledge at the pretest then still had inadequate knowledge at the post-test as many as 70 people and none became adequate at the post-test. This shows there is an influence between the treatment of knowledge mothers with the advanced immunization of the intervention group (p= 0,000). There is an influence between the treatments on advanced immunization knowledge of the control group (p= 0,000).

This is also consistent with the research of Navin *et al*. (2019), which states that counseling can increase respondents' knowledge about immunization, especially in areas with low levels of health knowledge (Navin *et al*., 2019). The method of counseling in this study is face-to-face or one researcher educating one respondent, and this is in line with previous research that education face to face can increase respondents' knowledge about immunization in children, especially in areas that experience immunization-related obstacles, moreover, mobile immunization strategy improved the immunization access and utilization in the health facilities (Shikuku *et al*., 2019). Parental knowledge is essential in increasing child immunization coverage (Mugada *et al*., 2017; Noh *et al*., 2018). Moreover, the ease of access to immunization in various health service facilities should also be prioritized. From the results of this research and discussion, it is recommended that the government increase the number of health facilities, especially in areas that have low immunization coverage (Siramaneerat & Agushybana, 2021).

Moreover, an attitude factor was found in the intervention group, the mothers with under two years child who had a positive attitude at the pretest and post-test as many as 19 people. In contrast, samples that have a negative attitude when pretest and became positive at the time of the post-test number 72 people, and 2 others remain in the negative attitude category. Mothers under two years child in the control group who had a positive attitude at the pretest and remained good when the post-test were 19 people, but there were no mothers with under two years child who had a negative attitude at the pretest and became positive when the post-test. At the same time, the sample that still had 74 negative people was pretest and post-test. This shows there is an influence between treatment to the attitude of the mothers in the intervention group (p= 0.000). There is no influence on the attitude of the mothers with under two years child to the continued immunization of the under two years child in the control group (p= 1,000[a]). In terms of the willingness variable, explained that mothers with under two years child in the intervention group who still agreed with continued immunization when the pretest and post-test were 25 people, while those who changed from the category of disagreeing willingness to agree were 59 people.

Based on the results of this research, counseling and SMS reminder interventions are effective against parental attitudes about the importance of immunization with a significance value of 0.000 (p <0.05). The results of these significant values are likely to occur because the interventions given have conveyed how attitudes towards the importance of immunization properly so as not to become a category of children with incomplete immunizations. Hu's (2015) study shows that counseling interventions in health promotion can improve knowledge, attitudes, and practices towards

Table 2. Analysis of Knowledge, Attitude, and Willingness of Mothers with Under Two Years Child's Advanced Immunization

Knowledge Pretest		Post-test		p-value
		Adequate	Inadequate	
Intervention	Adequate	25	0	.000
	Inadequate	68	0	
Control	Adequate	23	0	.000
	Inadequate	0	70	
Attitude Pretest		Positive	Negative	p-value
Intervention	Positive	19	0	.000
	Negative	72	2	
Control	Positive	19	0	1.000[a]
	Negative	0	74	
Willingness Pretest		Agree	Disagree	p-value
Intervention	Agree	25	0	.000
	Disagree	59	9	
Control	Agree	33	0	.500[a]
	Disagree	2	58	

(Source: Results Data, 2020)

vaccination among caregivers and suggests this strategy should be focused on caregivers with low education levels or with misinformation or bad perception about immunization and must be integrated into the immunization program (Hu, 2015). In addition, well-informed mothers will increase immunization coverage and are very cost-effective (Powell-Jackson *et al*., 2018). In contrast to other studies, a value obtained of p=0.592 where the SMS Reminder intervention did not affect parental attitudes about immunization even though the percentage of parents who had a positive attitude was higher than the negative attitude. This is explained in the disposition of the study, which means that the study was welcomed by parents but must be careful because even though the positive attitude towards the mother is strong if it is not balanced with good knowledge, it will not increase the coverage of immunization in children (Oladepo *et al*., 2019)

In this study, counseling, and interventions were SMS reminders effective against parents' willingness to immunize their children with a significance value of 0,000 (p <0.05). This is likely due to the reminder system that serves to remind parents to immunize their children because many parents claim to forget their child's immunization schedule often so it can be prevented by giving an SMS reminder the day before the immunization schedule. This is consistent with previous research, which says that text message reminders on mobile phones have the potential to increase child vaccination coverage (Mekonnen *et al.*, 2019; Mekonnen *et al.*, 2019). Most parents welcomed this SMS

Table 3. Comparison of Control Group and Intervention Pre-test - Posttest Knowledge, Attitude, and Willingness of Mothers with under two years of child Advanced Immunization.

		Control	Intervention	p-value (Chi-Square)
Knowledge Pretest	Adequate	23	25	0,738
	Inadequate	70	68	
Knowledge Posttest	Adequate	23	93	0,000
	Inadequate	70	0	
Attitude Pretest	Positive	19	19	1,000
	Negative	74	74	
Attitude Posttest	Positive	0	61	0,000
	Negative	93	32	
Willingness Pretest	Agree	33	33	1,000
	Disagree	60	60	
Willingness Posttest	Agree	12	51	0,000
	Disagree	81	42	

(Source: Results Data, 2020)

Reminder intervention because it was quite helpful in reminding their child's immunization schedule so that it was not missed (Oladepo *et al.*, 2019; Omoniyi & Williams, 2019; Mekonnen *et al.*, 2021). In another study, it was mentioned that effective immunization education interventions increase parental willingness, so child immunization coverage also (Jaca *et al.*, 2018; Mora & Trapero-Bertran, 2018). Immunization counseling in the form of video performances can increase parent willingness because the method is considered exciting and easier to understand (Hu *et al.*, 2018).

Mothers with under two years child in the control group were initially unwilling at the pretest, and when the post-test were 2 people and those who still disagreed were 58 people so it can be concluded that there is an influence between the treatment given to mothers with under two years child's willingness in the continued immunization of the under two years child in the intervention group (p= 0,000). There was no influence on the willingness of the mothers with under two years child in the continue immunization of the under two years child in the control group (p= 0.500[a]).

Based on Table 3, showing knowledge during the pretest in the control group was found that 23 respondents had adequate knowledge, and 70 respondents had inadequate knowledge. In contrast, in the intervention group, it was found that 25 respondents had inadequate knowledge, and 68 respondents had inadequate knowledge. Test Chi-Square results showed insignificant results because it has a p-value of 0.738 (p> 0.05). The results of the comparison of the attitude at the pretest in the control group found that 19 respondents had positive attitudes, and 74 respondents had traits negative. In comparison, in the intervention group, 19 respondents had positive traits, and 74 respondents had negative traits. Test Chi-Square results showed insignificant results because they had a p-value of 1,000 (p> 0.05). The results of the comparison of the willingness pretest in the control group found 33 respondents who agreed and 60 respondents who did not agree. In comparison, in the intervention group, 33 respondents agreed, and 60 respondents did not, the test Chi-Square results showed insignificant results because it had a p-value of 1,000 (p> 0.05).

Based on table 3 shows the current knowledge post-test on the control group found 23 respondents who had adequate knowledge and 70 respondents who had inadequate knowledge. In contrast, in the intervention group, 93 respondents had adequate knowledge, and no respondents had inadequate knowledge, test results Chi-Square shows significant results because it has a p-value of 0,000 (p <0.05). The comparison results of attitudes post-test in the control group did not show respondents had a positive attitude, and 93 respondents had a negative trait. In contrast, in the intervention group, it was found that 61 respondents had a positive trait, and 32 respondents had a negative trait. Chi-Square test results showed significant results because it had a p-value of 0,000 (p <0.05).

The comparison of the pretest knowledge of attitude, and willingness before being given treatment to the control group and the intervention group have insignificant results, it shows that the knowledge, attitudes, and willingness of the respondent before being treated either control or intervention are not much different. The results of the comparison of post-test knowledge, attitudes, and willingness after being treated in the control group and the intervention group showed significant results. This shows that knowledge, attitudes, and willingness after being treated in both controls and interventions have differences, which means the treatment given by researchers in the form of SMS Reminder and Counseling can affect the knowledge, attitudes, and willingness of respondents. This is consistent with the journal stating that according to Hu (2015), research shows that one-hour educational counseling given to parents in clinics that provide vaccinations is an effective and practical strategy to increase the level of knowledge about vaccination (Hu, 2015). Likewise, it is in line with research that explains that educational interventions can improve parent knowledge scores and their willingness to vaccinate their children (Otsuka-Ono *et al.*, 2019). In the study of Choi A. *et al* (2017), evaluating the effect of educational interventions on parental opinions about infection and immunization, the results of

the study indicate that counseling interventions improve parental attitudes toward vaccination (Choi *et al*., 2017). Other studies also show that parents who are good at vaccinating their babies four times (AOR=4.308, 95% CI: (2.609–7.111) are more likely to be knowledgeable than their peers. This may be related to an increase in the mother's educational status which increases people's health-seeking behavior. Parents have a positive influence on the absorption of infant immunization (Gebre *et al*., 2021).

In other research extrinsic factor related to incident pneumonia is education. The recommendation can be low incident to improve MCH (Maternal and Child Health) management, such as complete basic immunization, and routine vitamin A administration (Jannah *et al.*, 2021). In another study, it was explained that the text message reminder could help mothers who had attended immunization to complete their child's immunization to completion (Oladepo *et al.*, 2019; Yeung *et al*., 2018). The success of SMS reminder intervention will be 100% successful if every household has a functional cellular telephone, and the language in the text message uses the local language (Omoniyi & Williams, 2019). Other studies have shown that information is simply given to remind mothers that their children should be immunized, using low-cost interventions such as SMS reminders (Powell-Jackson *et al*., 2018). SMS reminders are useful for mothers who forget their vaccination appointment date (Abebe *et al*., 2019).

Based on Table 3, prior knowledge is the most influential variable in increasing mother's willingness to carry out further immunizations on their children. It was revealed that parental knowledge could increase willingness to complete child immunization (GebreEyesus *et al*., 2021; Akinrinade *et al*., 2018). This also provides information on the benefits of immunization as well as a form of health promotion in general (Omoniyi & Williams, 2020).

Table 4. Analysis of Factors Affecting Willingness Bivariate Mothers with Under Two Years Child Advanced Immunization

			Willingness		p-value
			Agree	Dis agree	
Knowledge	Pretest	Adequate	37	11	0,006
		Inadequate	29	109	
Attitude	Pretest	Positive	15	23	0,002
		Positive	51	97	
Age		18-29	37	78	0,653
		≥30	29	42	
Education Level		High	38	64	0,079
		Low	28	56	
Occu pation		Working	27	58	0,000
		Not Working	39	62	

(Source: Primary Data Processed, 2020)

Analysis of factors that influence mothers' wishes based on p-value p<0.25, namely attitude, level of education, and employment. However, the age factor did not influence the mother's desire to continue immunizing toddlers (p>0.25) so it could not be continued with the regression test.

Based on table 5 shows that adequate parental knowledge simultaneously influences the willingness of mothers to advance immunization for children. These results that knowledge and attitude before treatment, parental education level, and parental occupation have a significant p-value(p<0.05),

Table 5. Logistic Regression Factors Affecting Mother's Willingness in Under Two Years Child Advanced Immunization

Variables	B	Wald	Sig.	OR	95% C.I.for EXP(B)	
					Lower	Upper
LAST EDUCATION						
Low (< HS)	-,236	,417	,518	,790	,387	1.615
OCCUPATION						
Not Working	.478	1.676	,195	1.613	,782	3.324
ATTITUDE						
Positive	,086	,037	,848	1,089	,455	2.609
KNOWLEDGE						
Adequate	2.594	39.924	,000	13.384	5.986	29.926
Constant	-1.519	17.993	,000	.219		

(Source: Primary Data Processed, 2020)

which shows that there is a relationship with the level of willingness to carry out advanced immunizations. This is the following research by Kara *et al* (2018), which explains that the knowledge, attitudes, work, and education of parents influence the scope of child immunization (Kara *et al.*, 2018). In line with other studies that explain that the level of parental education and parental worker an important role in increasing the coverage of child immunization (Singh *et al.*, 2019). Another study also said the level of a mother's education affects health behavior (health-seeking behavior). It is also believed that the higher the mother's level of education, the higher the number of fully immunized children (Mugada *et al.*, 2017). Education also influences visits by child's age study from Mora 2018 found that less educated parents visit their general practitioner more often for immunizations when their child is under six years of age (Mora & Trapero-Bertran, 2018). Other studies show the results that knowledge increases with education level. This finding is similar to research on maternal knowledge, perceptions, and child immunization practices in Enugu, Nigeria, which found that up to 90% of mothers in the study had at least secondary school education, which influenced their knowledge (Akinrinade *et al.*, 2018). Based on Table 6, it was found that the age factor has a p-value that is not significant, so it shows that there is no relationship between the mother's willingness to continue immunization. In line with Mekonnen's 2021 study, the majority of mothers have the intention to use text message reminders for child vaccination. Mother's age, education, duration of mobile phone use, perceived usefulness, and perceived ease of use were associated with the intention of mothers to use text messages for vaccination (Mekonnen *et al.*, 2021).

This study found that parents of under two years child refused to be sampled because according to the local regional midwife, the parents refused their children to be immunized on the grounds of side effects of immunization and religion. It was also explained in the study of Navin *et al* in 2019 that there were strong differences in the vaccination behavior of parents who refused the vaccine for different reasons indicating that the reasons for rejection were different according to the different motivations of parents (Navin *et al.*, 2019). Thus, different interventions might be effective for different groups of rejections. For example, some vaccine-driven vaccine rejection can be overcome if religious leaders communicate with their congregations about the moral imperatives of vaccination, or if vaccines produce materials removed from vaccines originating from aborted fetal tissue. Another study stated the reasons given by more than half of parents not to vaccinate their children were lack of awareness of the importance of vaccination, and some significant respondents responded to fear of side effects of immunization and sick children as reasons (Abebe *et al.*, 2019; Chang & Lee, 2019).

Conclusions

The results of the research that have been done show that SMS reminders and counseling affect the knowledge, attitudes, and willingness of mothers to increase the coverage of under two years child continued immunization in the working area of Mrican Health Center in Kediri. As well as the factors that influence the mother's willingness to increase the coverage of under-two-year-old child immunizations are adequate knowledge.

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