

Innovative SiKaRen Smartphone Application Model: A Breakthrough in Enhancing IMP Cadres' Knowledge and Attitudes Toward Family Planning

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Abstract: *Objectives:* There are several challenges in the implementation of family planning programs in urban areas, one of which is to enhance the capacity of the urban community institutions (IMPs) as the first level of family counselling and support. The other major constraint is the limited availability of new and efficient training techniques, because conventional training is not very efficient in enhancing the knowledge and beliefs of IMP cadres. In the digital era, the use of smartphone-based technology could be the solution to improve the effectiveness of cadre training in a more flexible and interactive way. This study was conducted to assess the efficacy of the smartphone based SiKaRen application in enhancing the knowledge and attitudes of IMP cadres.

Methods: This study used a mixed-methods design, combining quantitative and qualitative approaches. The quantitative aspect employed a quasi-experimental design with pre- and post-tests on two groups: an intervention group using the SiKaRen Applications and a control group with conventional training. The qualitative approach explored the roles, knowledge, and attitudes of 10 Informants through in-depth interviews, focus group discussions (FGDs), and standardized questionnaires. Data were analyzed using statistical tests.

Results: The problem of the cadres was that they did not have the required knowledge about the advantages, disadvantages and side effects of various contraceptive methods, hence lacked the confidence of providing advice. When they encounter challenges, they just quit, but they do attempt to help and look for assistance. Furthermore, the role of the cadres is not optimal due to limited facilities, not clearly defined functions, missing documents and lack of innovation. The SiKaRen model based on a smartphone was found to have a significant effect in enhancing the knowledge and attitude of the cadres in the field (p -value < 0.05) and therefore could be a way of solving the problems faced by cadres in the field.

Conclusions: The integration of technology into the SiKaRen model enhances the ability of cadres to receive the latest information and to track and monitor family planning participants more effectively. This digital application also enables more precise interventions based on accurate data, meaning that cadres are not only facilitators, but also drivers of family planning awareness.

Keywords: Application, IMP Cadre, SiKare App, Family Planning, Unmet Need, Knowledge, Attitude.

INTRODUCTION

Indonesia is currently one of the most populous countries in the world, with a total population of 275.77 million recorded in 2022. The population is projected to continue increasing due to the persistently high birth rate, which poses significant challenges for national development. As a developing nation, rapid population growth may hinder progress across multiple sectors. A population surge is anticipated by 2030, and if not adequately addressed, it could exacerbate existing socio-economic issues. One of the main contributing factors to this growth is the elevated Total Fertility Rate

(TFR), currently at 2.19 children per woman, and projected to rise above 2.2 by 2050 based on data from the Central Statistics Agency (2021). This figure remains far from the Sustainable Development Goals (SDGs) target of reducing the TFR to 1.9 by 2100 [1]. Bridging the gap between the high fertility rate and the effectiveness of family planning programs remains a critical concern. Although Indonesia has implemented various initiatives to promote family planning, these efforts face persistent obstacles. The unmet need for family planning, coupled with suboptimal program implementation—largely due to a shortage of trained personnel and limited support from local governments—continues to undermine progress [2].

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The National Population and Family Planning Board (BKKBN) Strategic Plan 2020–2024 seeks to empower

communities and reduce population growth through strengthened family planning initiatives. In line with this, the Bangsa Kencana Program was introduced in 2019, focusing on improving access to quality reproductive health services, maternal and neonatal care, and community nutrition. However, several key indicators remain below target, including maternal mortality, neonatal mortality, unmet need for contraception, uptake of modern contraceptive methods, and childhood stunting [2]. The program's implementation within Family Planning Villages aims to enhance community resilience, yet significant challenges persist. These include low community participation in family planning education, inadequate availability of contraceptives, and limited capacity of community health cadres to engage and mobilize target populations. Furthermore, the disparity between the number of field officers (PLKB) and the actual demand in the field continues to constrain the program's effectiveness [2-4].

The Bangsa Kencana program in Indonesia can be regarded as successful due to the role that family planning cadres play in the program. However, family planning cadres come with different professional, educational and cultural backgrounds thus these differences in competency may affect the effectiveness of the program implementation. Motivation and competency of cadres are critical factors that may enhance the effectiveness of the family planning program in the community [5]. Based on BKKBN data in 2021, in West Sumatra there are 756 registered KB Villages, but not all KB Villages are active in community development. Padang City is the area with the lowest Poktan filling, with 34 KB Villages that do not have Poktan out of 104 existing KB Villages. This condition shows the need to increase the capacity and role of KB cadres in supporting the implementation of the Bangsa Kencana program so that the goal of improving family welfare can be achieved optimally [6,7].

The role of IMP (Urban Community Institution) cadres is crucial in supporting the implementation of smartphone-based education programs. As key grassroots actors within urban communities, IMP cadres are instrumental in disseminating information, assisting couples of reproductive age, and educating the public about the benefits of using technology to access reliable health information [8-11]. In the context of Indonesia's persistent high *unmet need* for family planning—where many couples wish to delay or prevent pregnancy but are not using any contraceptive methods—the contribution of these cadres becomes

even more critical. Their ability to provide accurate and timely information about contraception and reproductive health directly addresses barriers related to knowledge gaps, misinformation, and limited access to services. Therefore, improving the knowledge and skills of cadres is an essential component in closing the *unmet need* gap and strengthening the effectiveness of national family planning programs. Efforts to build cadre capacity have traditionally relied on face-to-face training, printed materials, and direct mentoring from healthcare professionals [12]. However, such conventional methods often face challenges, including limited time, high costs, and unequal access to quality educational resources [13,14]. With the rapid advancement of digital technology, innovative and accessible educational models are urgently needed. Smartphone-based education offers a promising solution by enabling cadres to access learning materials flexibly—anytime and anywhere. This can include interactive applications, educational videos, e-learning modules, and online discussion forums that facilitate knowledge-sharing among cadres and health professionals. Not only does this approach improve cadres' knowledge, attitudes, and practical skills, but it also enhances their ability to engage and educate fertile couples in their communities. By strengthening the competencies of cadres through smartphone-based learning, this intervention indirectly contributes to reducing *unmet need* for family planning. When cadres are equipped with accurate and updated knowledge, they can better support couples in understanding the importance of family planning, available contraceptive options, and overall reproductive health. Increased awareness and informed decision-making among couples are key to ensuring contraceptive needs are met. Therefore, smartphone-based education plays a dual role: empowering cadres and simultaneously enhancing community-level outcomes in reproductive health. This study aims to evaluate the effectiveness of the SiKaRen smartphone application in improving the knowledge and attitudes of IMP cadres, with the ultimate goal of contributing to the reduction of *unmet need* and supporting the success of Indonesia's family planning initiatives.

This research presents a novel contribution by introducing a technology-based education model that can be replicated across various public health programs. It addresses a critical research gap by exploring the effectiveness of a digital approach in enhancing the competency of family planning cadres, which is essential for the successful implementation of reproductive health initiatives. Furthermore, this study

provides evidence-based recommendations for policymakers to integrate digital solutions into family planning programs, ultimately supporting efforts to reduce high birth rates and improve reproductive health outcomes in Indonesia.

METHODS

This study used a mixed-methods design, combining quantitative and qualitative approaches. This research is a quantitative and qualitative mixed-method research. The research was conducted in Padang City, West Sumatra, Indonesia from February - December 2024.

Research Design

The quantitative aspect used a quasi-experimental design with pre- and post-tests on two groups. The qualitative approach explored in depth the knowledge, attitudes and roles of IMP cadres in supporting family planning services. The study was conducted at 3 Community Health Centers (Puskesmas) in Padang City, namely Puskesmas Bungus, Nanggalo, Rawang and Kuranji. Quantitative data were collected using a questionnaire that had been tested for validity and reliability. While the quantitative research was obtained from the results of in-depth interviews and focus group discussions (FGDs) to find out more about the knowledge, attitudes, and roles of IMP cadres.

Research Participants

Quantitative research using a 1:1 comparison sample between the experimental and control groups. The sample consists of two groups, namely the experimental group of 44 IMP cadres who received the SiKaren implementation model intervention and the control group of 44 IMP cadres who received the conventional method. The sample size in this study was determined using a hypothesis test for the difference between two paired means, with a significance level of 5% and a power of 80%. Based on the sample size calculation, the minimum required number of participants was 16 individuals per group. However, to increase the statistical power of the study, total sampling was employed.

Qualitative research methods are used to produce detailed descriptions of the cadres' experiences while supporting family planning service activities related to knowledge, attitudes, roles, and problems faced by cadres in the field. The number of informants is 10 people consisting of 4 IMP cadres, 4 people from the

Women's Empowerment, Child Protection, Population Control, and Family Planning Service (DP3AP2KB), 1 person from the National Population and Family Planning Agency (BKKBN), 1 person, Family Planning Field Extension Worker (PLKB). The informant criteria are key Person, namely cadres of the Urban Community Institution (IMP) Family Planning (KB). Supporting participants are people who know and have information related to the research topic. To maintain the confidentiality of informants, researchers give informants codes 01-10 and provide informed consent as approval to become research respondents/informants.

Statistical Analysis

Quantitative data analysis used univariate analysis to see the frequency distribution and bivariate analysis used the T-dependent Test to see the difference in knowledge of intervention attitudes before and after providing education using the SiKaren Application. In qualitative research, data processing was carried out based on interview transcripts and FGDs from recordings of the interview process. The descriptions or notes obtained were refined and completed into one written transcript. The analysis was carried out by grouping the results based on the available themes. Meanwhile, the grouped themes were interpreted, and conclusions were drawn for each topic. Qualitative data analysis used triangulation.

Statistical Analysis Procedures

Prior to the intervention, the first step undertaken by the researchers was to conduct a baseline equivalence test between the intervention and control groups for the variables of knowledge and attitude. The normality test using the Kolmogorov-Smirnov method indicated that the data were normally distributed ($p\text{-value} > 0.05$). Therefore, the Independent T-Test was employed to assess group equivalence. The results showed no significant differences between the two groups at baseline (pre-test), confirming that both groups were comparable prior to the intervention.

Following the intervention, a Paired T-Test (T-dependent test) was conducted within each group to compare pre-test and post-test scores. This analysis aimed to determine whether there was a statistically significant improvement or change within each group after receiving the intervention. To assess the effectiveness of the intervention between groups, the most appropriate approach was to calculate the

difference (delta) between post-test and pre-test scores for each individual. These delta scores were then compared between the intervention and control groups using an Independent T-Test.

Additionally, to evaluate the extent to which the intervention influenced the dependent variables, a multivariate analysis was performed using logistic regression.

Ethics Statement

This research has received ethical approval from the research ethics commission team of the Faculty of Medicine, Andalas University with No: 157/UN.16.2/KEP-FK/2024. Participants gave written consent regarding their willingness to be respondents. Interviews and FGDs were conducted at times and places agreed upon by the informants, such as in the workspace, the informant's home, and a private meeting room.

RESULTS

The results of the study were obtained by analyzing information obtained from 10 respondents, consisting of 4 IMP cadres, 4 people from the Women's Empowerment, Child Protection, Population Control, and Family Planning Service (DP3AP2KB), 1 person from the National Population and Family Planning Agency (BKKBN), 1 person, Family Planning Field Counselor (PLKB). The characteristics of informants in qualitative studies can be seen in Table 1.

Researchers conducted in-depth interviews with IMP Cadre informants to explore information related to knowledge, attitudes, problems and actions taken by IMP Cadres in the field in providing family planning

counseling to the community and Fertile Age Couples. Researchers also conducted Focus Group Discussions (FGD) together with BKKBN, DP3AP2KB, and PLKB which aimed to ensure the validation of qualitative results and triangulation of data sources that could increase confidence in the answers given by IMP Cadre informants.

Knowledge

The results of the interviews in this section provide an overview of the cadres' understanding and knowledge related to family planning methods, the advantages and disadvantages of each family planning method and reproductive health among couples of childbearing age. Based on the results of the interviews, some informants could not provide complete answers related to the forms of family planning methods and their details, namely: pills, injections and IUDs.

"The forms of family planning methods are usually 1-month and 3-month injections, some take pills and some are implanted like an IUD". (Inf-1)

"What I often hear from health workers is that the common family planning methods are injections and pills. I know there are others like implants and IUDs, but I have never seen how they are fitted myself. If there are mothers who want to know more, I usually direct them to midwives because they know more about it". (Inf-4)

"There is not only one type of birth control, and each mother can choose according to

Table 1: Summary of the Participants' Characteristic

Participants	Age(y)	Sex	Education	Criteria
Inf-1	38	Female	Senior high school	IMP Cadre
Inf-2	41	Female	Bachelor degree	IMP Cadre
Inf-3	44	Female	Senior high school	IMP Cadre
Inf-4	49	Female	Senior high school	IMP Cadre
Inf-5	43	Female	Bachelor degree	BKKBN
Inf-6	38	Male	Bachelor degree	DP3AP2KB
Inf-7	37	Female	Bachelor degree	PLKB
Inf-8	42	Female	Senior high school	PLKB
Inf-9	47	Female	Senior high school	PLKB
Inf-10	39	Female	Senior high school	PLKB

their needs. If you are still breastfeeding, it is usually more suitable to use special pills for breastfeeding mothers or injectable birth control. If you want long-term birth control without the hassle, an IUD or implant can be an option because it can last for years. If you often forget, it's better to avoid birth control pills because you have to take them every day. If some moms are worried about the side effects of hormones, they can use non-hormonal birth control like the IUD or look at the calendar. If you are sure you don't want to have more children, use permanent birth control, there are two options, one is tubectomy and the other is vasectomy.” (Inf-3)

“There are many kinds of family planning methods, some are hormonal family planning such as birth control pills, birth control injections, and implants. There is non-hormonal family planning such as IUDs and condoms. There is also emergency birth control taken within 72 hours after intercourse to prevent pregnancy.” (Inf-2)

The interviewer further asked about the advantages and disadvantages of each family planning method. The informant was unable to explain precisely the advantages and disadvantages of each method. Excerpts of the informants' statements regarding the advantages and disadvantages of each method are as follows:

“Honestly, I often recommend injections or pills because they are the easiest for the women here. But if someone asks about implants or spirals, I usually say 'try asking the midwife deh' because I don't know the advantages and disadvantages compared to other family planning methods. I know that implants can last a long time, but some people say they're afraid of having it implanted in their arm. I also don't know if there are certain side effects that should be considered before choosing birth control.” (Inf-4).

“When asked about birth control, the ones I see most often are injections and pills. The good thing about injectable birth

control is that you don't have to remember to take it every day, just go to the health center once a month or every three months. If it's the pill, you have to be diligent in taking it every day. But about the side effects, I don't know for sure. Some people say that their periods become irregular after injecting birth control, but there are also those who don't mind. For implants or spirals, I don't know the details, so usually if a mother asks, I tell her to go directly to the midwife.” (Inf-1).

The interviewer continued to ask about reproductive health in preventing sexually transmitted diseases. Most informants could explain how to prevent sexually transmitted diseases, such as the following statement:

“STDs can be prevented by being faithful to your partner and using condoms when at risk. If you change partners frequently, the risk is higher. Therefore, it is also important to always maintain hygiene and regularly check your health if there are strange symptoms.” (Inf-1).

“The most important thing is not to be shy to check at the health center. If there are symptoms such as excessive vaginal discharge or pain when urinating, it's better to get checked. There are now many free check-ups for HIV and other diseases, so take advantage of the facilities available.” (Inf-2).

“Apart from preventing pregnancy, condoms are also effective for preventing STDs. Many are still reluctant to use them, even though this is the safest way. If you don't want to use them, at least be faithful to your partner and maintain personal hygiene.” (Inf-3).

Conclusions from interviews and FGDs on cadres' knowledge can be seen in Figure 1.

Attitude

Researchers further explored information related to the attitudes of IMP KB cadres in facing problems in the field. The results of informant interviews related to the attitudes that arise when cadres face problems are in the form of feelings that arise when facing problems: sad, upset, tired and angry. The quote is as follows

Types of Contraceptive Devices	Advantages and Disadvantages of Each Contraceptive Device	Prevention of sexually transmitted diseases (Reproductive health)
<ul style="list-style-type: none"> • Injections, IUDs, pills • Birth control pills specifically for breastfeeding mothers, birth control injections, IUDs or implants • Non-hormonal birth control such as IUD, calendar, tubectomy and vasectomy. • Hormonal birth control such as birth control pills, birth control injections, and implants, IUDs and condoms. There is also emergency contraception. 	<ul style="list-style-type: none"> • Ask the midwife • I don't really understand myself • Increased hormones, changes in body shape and weight 	<ul style="list-style-type: none"> • Conduct routine check-ups • Maintain personal hygiene • Do not engage in casual sex • Be faithful to your partner

Figure 1: Matrix of In-depth Interview and FGD Results of Informants Regarding Cadres' Knowledge of Family Planning.

"At that time it felt like I wanted to stop being a cadre, I was tired of being a cadre even though I had to be strengthened". (Inf-3)

"I sometimes get annoyed by the words of families who do not want to use family planning, even though I want to provide the best solution, I want to get angry too". (Inf-1)

"When asked about complaints, sometimes I am sad, because I have tried to do well, the honor is sober and drains my calm too". (Inf-4)

The interviewer also dug up information related to the response of cadres when facing problems. The results of the interview obtained the results of the cadre's response, namely: relaxed, silent, and resigned in facing problems.

"Mostly we just take it easy, maybe we explain again to the family and family planning participants regarding the problem." (Inf-3).

"For me, I am more silent, if there are many complaints such as far locations, inadequate facilities, I just keep quiet, I also can't do anything". (Inf-1)

"I surrender and understand how much honorarium I want to be given, the important thing is to be given, so I'm grateful". (Inf-4).

The interviewer further explored information related to the actions taken by cadres when facing problems. Actions taken by cadres when facing problems from the information obtained in the form of continuing to provide services, talking to friends and refreshing. Information obtained from the following quote:

"Although the facilities are not complete, I still provide counseling with the available facilities, I still convey it directly to family planning participants". (inf-1)

"If there is already a problem, we cadres usually complain while confiding in each other, sometimes exchanging stories and sharing solutions". (inf-2)

"Usually to avoid stress we do refreshing such as eating together at the yandu, if there is excess cash we go for a walk in the city, just to keep sane bukas..." (Inf-3)

Conclusions from interviews and FGDs on cadres' Attitude can be seen in Figure 2.

Researchers further explored information from informants related to problems faced by cadres in providing family planning services to the community and childbearing age couples. In this theme, researchers obtained information related to the problems faced by cadres, namely inadequate facilities and resources, lack of family support, and inadequate compensation. Conditions like this can lead to a decrease in the role of cadres. The following are excerpts of informants' answers related to the problems faced by cadres in providing family planning services:

Feelings that arise when facing problems	Cadre response when facing problems	Actions taken by cadres when facing problems
<ul style="list-style-type: none"> Feelings that arise when cadres face problems include feelings of tiredness, annoyance, anger and sadness. Just normal Trying to accept cadre complaints 	<ul style="list-style-type: none"> The cadre's response when facing problems is to try to relax, be more silent and surrender. Dealing with self Reporting to PLKB Trying to calm cadres 	<ul style="list-style-type: none"> The actions taken by cadres when facing problems are to continue providing services, sharing with friends and refreshing themselves The PLKB, Health Center and midwives responded to the sub-district cadres regarding problems in the field

Figure 2: Matrix of In-depth Interview and FGD Results of Informants Regarding Cadres' Attitude of Family Planning

"In the field, there is still a lot of lack of facilities. For example, we sometimes need props or brochures so that mothers understand more about family planning, but often the stock is limited. So we can only explain using words, whereas if there are pictures or other tools, it must be easier to understand". (Inf-4).

"In more distant and remote areas, access to the puskesmas is not always easy. Sometimes there are women who want to install an IUD or implant, but because the place is far and transportation is difficult, they end up canceling. If there were mobile family planning facilities or a more frequent schedule, more people would be helped". (Inf-1).

Conclusions from interviews and FGDs on cadres' problem can be seen in Figure 3.

The Role of IMP Cadres

In this theme, researchers explored information related to the 6 roles of IMP cadres. The results of the interviews were related to the implementation and understanding of informants related to the 6 community service roles of cadres. Almost all informants did not understand and carry out the 6 service roles. The following are excerpts from interviews with informants related to organizing "

"I think there is a division of tasks, but I don't understand the details myself. Sometimes I come to the posyandu, sometimes I just tell the mothers around my house. If someone asks for more information about family planning, I usually tell them to go directly to the midwife." (Inf-3)

"I am not sure about this organizing. What I know is that my job is to encourage women to join the family planning

Inadequate facilities and resources	Lack of family support	Inadequate compensation
<ul style="list-style-type: none"> The facilities are still lacking. If there were pictures or other aids, it would be easier to understand. Access to the puskesmas is not always easy either, the place is far and transportation is difficult, so I canceled. 	<ul style="list-style-type: none"> The husband doesn't agree, afraid that his wife is barren. In-laws or family who are against it, many children are sustenance, so it should not be prevented. 	<ul style="list-style-type: none"> Compensation, yes, is still minimal. There's no transportation money. Working from morning to evening, the compensation is not much.

Figure 3: Matrix of In-depth Interview and FGD Results of Informants Regarding Cadres' Problem of Family Planning.

program, but I don't really understand how to organize the group or work with other staff. So far, I just follow the direction of the PLKB.” (Inf-1).

The following are excerpts from interviews with informants related to meetings:

“There are regular meetings, but I rarely participate because sometimes there is no clear information or the time clashes with home affairs. So I mostly get information from other cadre friends or if I happen to meet at the posyandu.” (Inf-2).

The following are excerpts from interviews with informants related to IEC (Communication, Information and Education) and Counseling:

“I once tried to give counseling to the women, but they asked all kinds of questions and I couldn't answer. If that's the case, I just say 'try asking the officer later'.” (Inf-4)

The following are excerpts from interviews with informants related to Recording and Reporting:

“There should be data collection on family planning acceptors, but I don't know what to record. Usually when a midwife asks for

data, I just give the bare minimum information, never write it down completely.” (Inf-2)

The following are excerpts from interviews with informants related to service activities:

“If there are family planning services at the puskesmas or posyandu, I rarely help. I think that's the job of midwives and health workers, so I don't get too involved.”. (Inf-1).

The following is an excerpt from an interview with an informant related to Independence:

“There is no salary for being a cadre, I just want to help. But sometimes I think, if the compensation is small and there is a lot of work, I'm too lazy to be more active.” (Inf-4).

Conclusions from interviews and FGDs on cadres' roles of services can be seen in Figure 4.

Effectiveness of SiKaRen Model Application

SiKare Application (Cool Cadre Application/ Aplikasi Kader Keren) is the first application specifically for cadres that appears in the form of E-Learning and as the name implies this application is intended to help

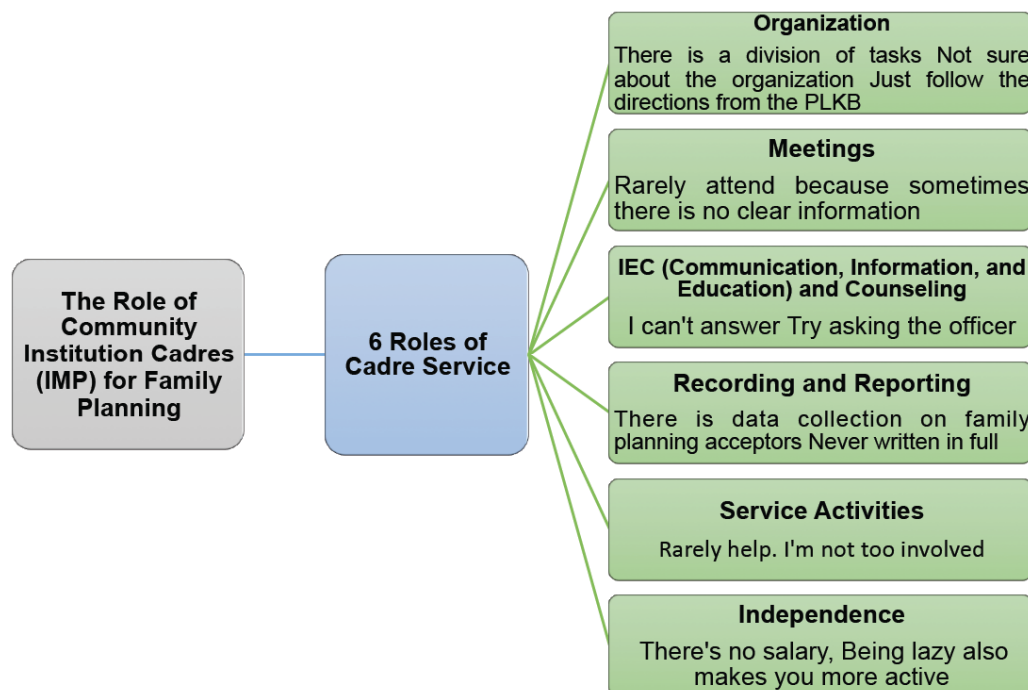


Figure 4: Matrix of In-depth Interview and FGD Results of Informants Regarding The Role of Community Institution Cadres (IMP) for Family Planning.



Figure 5: SiKareN Application.

cadres in making innovations, counseling, collecting data and adding cadre insights for improvement towards a better direction later. The SiKaRen application comes with complete and interesting features around the use of modern KB, Reproductive Health, Sex Education and Data Collection programs that are packaged in a more complete, interesting and easy-to-understand form. This model includes an intervention component consisting of education on the development of family planning cadres and the main tasks of family planning cadres. The components of this model are to improve the ability of family planning cadres in understanding the role of cadres and the use of family planning, including: the concept of family planning cadres, the concept of strengthening the role of family planning cadres in family planning services, the concept of reproductive health in couples of

childbearing age (PUS). Each component can be accessed at smartphone trough SiKareN Application on the page <https://play.google.com/store/apps/details?id=com.zulfikar.sikaren>. The SiKareN Application display can be seen in Figure 5 above.

The characteristics of the respondents can be seen in Table 1. This study was divided into two groups, namely experimental and control groups.

The results showed that in the experimental group, the majority of respondents were aged 36-45 years (52.1%), while in the control group the majority were aged 46-55 years (59.1%). In terms of education, most respondents in both groups had a high school education level, with a higher proportion in the control group (81.8%) than in the experimental group (65.9%). Meanwhile, respondents with a bachelor's degree were

Table 2: Respondent Characteristics

Variables	Experimental Group		Control Group	
	n	%	n	%
Age (year)				
36-45	23	52.1	18	40.9
46-55	21	57.7	26	59.1
Education				
Senior High School	29	65.9	36	81.8
Bachelor's Degree	15	34.1	8	18.2

Table 3: Bivariate Analysis of Knowledge and Attitudes of IMP Cadres in the Experimental Group and Control Group Before and After the Intervention Using the SiKare Application

Variables	Group	n	Pre-test		Post-test		p-value
			Mean	SD	Mean	SD	
Knowledge	Experimental	44	59.88	9.79	81.70	9.70	0.0005
	Control	44	58.18	9.28	65.23	9.88	0.157
Attitude	Experimental	44	27.93	2.91	35.42	2.01	0.005
	Control	44	28.56	3.42	29.55	2.85	0.901

Table 4: Multivariate Analysis of the Effect of the SiKare Model on the Knowledge and Attitudes of IMP Cadres

Variables	B	SE	Sig.	OR	95% CI	
					Lower	Upper
Knowledge	2.722	0.635	0.0005	2.993	4.610	55.485
Attitude	1.889	0.745	0.001	1.151	1.035	31.651

found more in the experimental group (34.1%) than in the control group (18.2%). This shows that the age and education characteristics of cadres in both groups have a relatively balanced distribution, although there is a slight difference in the proportion of education levels.

The results showed that there was a significant increase in knowledge and attitude in the experimental group using the SiKaRen Application Model. The average knowledge score increased from 59.88 ± 9.79 to 81.70 ± 9.70 (p -value = 0.0005), while in the control group it only increased from 58.18 ± 9.28 to 65.23 ± 9.88 (p -value = 0.157). The attitude of cadres in the experimental group also increased significantly from 27.93 ± 2.91 to 35.42 ± 2.01 (p -value = 0.005), while the control group showed no significant change (p -value = 0.901).

Table 4 presents the final model from the multivariate analysis. Based on the results, IMP cadres who received the intervention through the SiKare application were nearly three times more likely to show an improvement in knowledge compared to those in the control group (AOR = 3.09; 95% CI: 4.61–55.48), after adjusting for attitude.

DISCUSSION

Based on the research results it can be concluded that the application of SiKare Model with the use of mobile phones has been efficient in enhancing the knowledge and attitude of the IMP cadres in Padang City. As the front line in the community, IMP cadres are an important component in the achievement of an effective, inclusive and sustainable Family Planning

program. They are the go-between for the community and health facilities, assist childbearing couples on the importance of family planning and promote the use of contraceptives that are suitable to the individual or family. The SiKaRen application is available to support the IMP cadres by providing easily accessible information about the basic concepts of IMP cadres, family planning, and IMCI, and also to enhance the role of cadres in family planning and reproductive health of fertile couples. Therefore, this application is helpful in the achievement of the Bangsa Kencana Family Planning program in Padang City.

The results of this study indicate that receiving education through the smartphone-based SiKare Application effectively increases cadre knowledge (p -value = 0.0005). In line with Paramitha's research in 2022, cadre education using a family planning pocket book increases cadre knowledge and skills in changing couples' perceptions about family planning (p -value = 0.001) [15]. Another study conducted by Sari *et al.* (2023) showed that mobile health (mHealth)-based applications can improve the understanding and compliance of family planning cadres in conveying information to the community, as well as helping cadres in providing reproductive health education more effectively [16]. The importance of cadre knowledge and perceptions of the benefits, barriers, self-efficacy, impact of activities, and situational influences related to their behavior in promoting family planning has also been identified [17]. Knowledge is one of the cognitive factors that plays an important role in shaping health behavior. Individuals with a good understanding of reproductive health and the concept of family planning

are better able to make responsible decisions related to reproductive health [18]. Knowledge not only influences how individuals perceive health risks, but also guides their actions in adopting and participating in health prevention efforts.

Empowerment of Family Planning Counselors is essential to build strength by encouraging, motivating, and raising awareness of the potential possessed by Family Planning Counselors and trying to develop and improve knowledge, skills, and abilities as well as critical thinking maturity to increase professional capacity and competence to successfully support family planning programs [19].

Attitude is an individual's tendency to respond to objects or situations in a certain way, either positively or negatively [18]. Individuals with good knowledge tend to develop good attitudes as well [20]. Research conducted by Rahmawati (2023) found that the use of digital-based applications in training family planning cadres can increase positive attitudes of cadres in promoting contraceptives to fertile couples [21]. The importance of attitude in determining the success of public health programs and the role of individuals in their implementation has also been widely discussed in various studies [18].

This study found that education using the smartphone-based SiKaren Application effectively improved the attitudes of IMP cadres (p -value = 0.005). Positive attitudes and better skills can develop. For family planning cadres, high knowledge, positive attitudes, and strong skills will make them more adaptive to change, able to handle problems effectively, plan their work, and evaluate it more accurately [15]. Other studies show that good attitudes and behaviors will guide someone to have clear goals and directions, thus motivating them to participate in the implementation of family planning programs [21,22].

The role of family planning cadres greatly determines the success of the family planning program. In this regard, empowerment of family planning cadres is needed to improve their skills in the family planning program [21-23]. Through the smartphone-based SiKaren application, it will be easier for IMP cadres to carry out their daily tasks, so that they can support the proud family planning program. The main function of the SiKaren Application is not only to improve the knowledge and attitudes of cadres, but also to make their work in the field easier. This application provides

quick access to relevant information, tools to help deliver education to the community, and reporting features that allow cadres to document their interactions with fertile couples more efficiently. With this application, cadres can save time and energy in searching for information and focus more on implementing the family planning program. In addition, the use of technology in cadre education also helps increase their confidence in conveying reproductive health and family planning information to the community, so that the interventions provided are more effective and based on scientific evidence.

The implementation of the SiKaRen application is also expected to make a significant contribution to reducing the unmet need rate, namely the number of fertile couples who want to use contraception but do not have adequate access or information. BKKBN (2022) reported that one of the main causes of the high unmet need rate in Indonesia is the lack of accurate information and adequate education regarding contraceptive options. With the SiKaRen application, IMP KB cadres can be more effective in providing assistance and counseling to the community, so that awareness and participation in the family planning program can increase. A study by Setiawan *et al.*, (2021) also showed that the use of digital media in training health cadres can increase the effectiveness of educational services and accelerate the adoption of evidence-based practices at the community level. It is hoped that the development of the SiKaRen application can continue to be carried out with various more sophisticated technological innovations. Integration with the national health system, such as electronic recording of family planning participants, contraceptive schedule reminders, and online discussion forums for cadres and the community, can further increase the benefits of this application [24,25].

In addition, the development of artificial intelligence (AI)-based features that can provide personalized education recommendations based on the needs of cadres and the community can also be an innovative step in increasing the effectiveness of the family planning program. The synergy between the government, academics, and the private sector in supporting the implementation of the SiKaRen application is also a great hope so that this program can continue to be sustainable and have a wider reach. With this innovation, it is hoped that SiKaRen can become a new milestone in the transformation of IMP KB cadre education towards a more technology-based system. Increasing access to quality information,

improving the attitudes of cadres to be more proactive, and ease in implementing counseling are expected to have a long-term impact on the success of the family planning program in Indonesia. If this application can be optimized properly, the family planning program can not only improve family welfare, but also contribute to national health development more broadly. Therefore, technological innovations such as SiKaRen need to continue to be supported and developed so that they can become a sustainable solution in supporting IMP KB cadres in carrying out their duties more effectively and efficiently.

CONCLUSION

The role of cadres is very important in the success of Family Planning (KB) services in the community, especially in providing education and supporting the compliance of fertile couples in using contraception. To increase the effectiveness of the role of cadres, training is needed that can improve their knowledge and attitudes. One of the innovations that has been developed is the smartphone-based SiKaRen Model, which is designed to support IMP cadres in providing more optimal services. The results of the study showed that the use of the SiKaRen Model had a significant influence on improving the role, knowledge, and attitudes of cadres in the field, so that it can be an effective strategy in improving the quality of KB services in various regions.

Based on these findings, several recommendations are given to related parties to support the implementation of the SiKaRen Model. The Ministry of Health is expected to integrate the SiKaRen Model into the national training program to reduce the number of Unmet Needs, in collaboration with the BKKBN and the Health Office in implementing and evaluating the program. The BKKBN is advised to make the SiKaRen Model a standard training module for IMP KB cadres, while the Health Office can apply it in coaching cadres at the regional level and provide supporting facilities. From an academic perspective, this research is expected to encourage the development of technology-based innovation in family planning services and become a reference for further research that evaluates the long-term impact of the SiKaRen Model on the behavior of cadres and fertile couples.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. First, the

sample was limited to IMP cadres within the working area of a single public health center (Puskesmas), which restricts the generalizability of the results to broader populations or regions with different demographic and contextual characteristics. Second, although the use of smartphone-based training represents an innovative approach, its implementation faced technical challenges, including limited internet connectivity and variations in cadres' digital literacy, which may have influenced the effectiveness of the intervention. Nonetheless, the sample size was determined based on appropriate power analysis, ensuring sufficient statistical power to detect meaningful differences between the intervention and control groups.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author.

CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

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