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Implementation of BampiApp in an Effort to Improve Maternal Knowledge, Attitudes, and Skills in Providing Complementary Food

Implementasi Penggunaan BampiApp dalam Upaya Meningkatkan Pengetahuan, Sikap, dan Keterampilan Ibu dalam Pemberian MP-ASI

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ABSTRACT

Background: When a baby turns six months old, breast milk will no longer be able to meet their nutritional needs during the growth phase. The age range of 6 to 10 months is an important and sensitive phase of growth and development. Therefore, it is necessary to provide complementary foods according to the age stage. Efforts that need to be made include conducting health education activities that promote healthy living behaviors, one of which is nutrition education using BampiApp.
Objectives: This study analyzed the difference before and after nutrition education using BampiApp on knowledge, attitudes, and skills related to complementary feeding in Tumbang Samba Village, Katingan Tengah Sub-district, Central Kalimantan.
Methods: This study was a quasi-experiment with a one-group pretest-posttest design. The sample in this study consisted of 33 mothers with babies aged 6-10 months at Tumbang Samba Village, Katingan Tengah Sub-District, Central Kalimantan, chosen by purposive sampling method. Education was conducted through verbal communication to provide explanations to research respondents using BampiApp, which contains information related to complementary feeding. BampiApp was accessed online, and respondents were given one week to comprehend the material presented within the application. Data were analyzed using McNemar's test to determine differences before and after treatment.
Results: The result showed a significant increase in knowledge, attitudes, and skills in providing complementary feeding to babies in the intervention group ($p<0.05$).
Conclusions: BampiApp can be an alternative media for the government and health workers in providing education to increase mothers' knowledge, attitudes, and skills about complementary feeding.

INTRODUCTION

The period between 6 to 10 months is recognized as a vital and sensitive phase in growth and development[1]. Mother's Milk (ASI) has an irreplaceable role in facilitating optimal growth and development of children, serving as the main source of nutrition, which is significant for babies up to 24 months old. After reaching the age of 6 months, breast milk can no longer meet nutritional needs during growth. Therefore, it is important to provide complementary food for ASI (MP-ASI) as an additional step to ensure that the nutritional intake needed by the baby is met[2,3]. At this stage, babies begin to understand variations in food texture while their digestive system still adapts to the food consumed. There are still some mistakes in determining the right texture for complementary foods in this age range. This confusion is caused by the fact that the consistency of MP-ASI food for babies aged 6-10 months should be soft and easy to process, so it is an interesting area for researchers to carry out studies focused on this phase. Education level plays an important role in a mother's knowledge. Mothers with higher levels of education generally have a broader understanding and the ability to think more rationally in making decisions about their baby's health[4]. In addition, they are also more careful and pay close attention to ensure that the complementary foods given to babies meet good quality standards[5].

One of the measures implemented within the framework of the National Medium Term Development Plan (RPJMN) for the 2020-2024 period in Central Kalimantan Province is the launch of a program to improve the nutritional welfare of the community. This program involves Infant and Child Feeding Extension Training (IYCF) as an integral part of the effort. This program is specifically aimed at Posyandu (Integrated Healthcare Center) cadres[6]. This training aims to increase

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the knowledge and skills of Posyandu cadres in providing appropriate information and guidance regarding infant and child feeding. This training aims to ensure that Posyandu cadres understand proper nutrition for children to support their optimal growth and development. With this training, it is hoped that Posyandu cadres will be able to provide effective counseling to parents or child caregivers regarding providing balanced and nutritious food to babies and children and are expected to contribute to improving the nutritional status of the community and children's health in Central Kalimantan Province. The results of RISKESDAS data for Central Kalimantan Province (2018) showed that the prevalence of a variety of foods consumed by children in Central Kalimantan at the age of 6-11 months was 26.97%[6]. This proves that the diversity of feeding for babies aged 6-10 months in Central Kalimantan Province has not yet reached the maximum target of 39.43%.

Efforts need to be made to increase mothers' knowledge, attitudes, and skills by carrying out health education that can be delivered using various media and adjusting to the targets to be studied. One of the widely used media is education in the form of Android applications such as *BampiApp*. Several studies have revealed that nutrition education through Android applications positively affects the knowledge and skills of mothers' babies[7]. *BampiApp* contains the meaning of MP-ASI, the purpose of giving good MP-ASI, the benefits of MP-ASI for babies, the types and forms of MP-ASI according to the stages of the baby's age, the selected MP-ASI recipe, a nutritional calculator for baby's intake needs, things to avoid in providing MP-ASI, as well as video tutorials on examples of making MP-ASI which have been specifically designed to provide complete guidance regarding MP-ASI for babies aged 6-10 months in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan. Indirectly, this research can help prevent malnutrition in babies in Indonesia. The Android application is a great fit as an educational medium. Education using the Android application is easy to carry and easily accessible to users[8].

Researchers are interested in conducting this research with the aim of supporting mothers' knowledge, attitudes, and skills in providing complementary feeding through *BampiApp* (MP-ASI Baby Application). Through the use of *BampiApp*, this research is also expected to increase mothers' positive attitudes towards complementary feeding to motivate mothers to adopt a healthy diet for their babies, and the results of this research can provide valuable input for the development of community nutrition programs in the area. And has the potential to improve the overall health and nutrition of babies.

METHODS

This study applied a quasi-experimental method with a single-group pretest-post-test design. The initial design involved observation through a pre-test before being given the nutrition education treatment using the *BampiApp*. After nutrition education through the *BampiApp* was provided, a post-test was conducted to see the changes before and after treatment. Education was taken orally to research respondents using the *BampiApp,* which contained information regarding complementary feeding. The use of this application online given one week for respondents to understand the material contained in the application. This research was conducted in Tumbang Samba Village, Central Katingan District, Central Kalimantan. Data collection was taken from 01 February to 18 March 2023. The research participants consisted of 33 mothers whose babies were 6-10 months old, selected through purposive sampling, lived in Tumbang Samba Village, had an android phone, could read, had good communication skills, and were willing to become research respondents. Knowledge, attitudes, and skills related to complementary feeding were evaluated using a questionnaire tested for reliability (with r count > r table). The results of the questionnaire are grouped by category[9]:

The knowledge questionnaire was filled out by respondents consisting of 20 multiple choice questions with three answer options (a,b,c).
Knowledge scoring formula = $\frac{\text{Number of scores answered correctly}}{\text{Total maximum score}}$ x 100%
Category: Good <50%, Poor >50%

Respondents filled out the attitude questionnaire with 15 positive and negative statements with five categories (SS = Strongly Agree, S = Agree, RR = Doubtful, TS = Disagree, and STS = Strongly Disagree).
Attitude scoring formula = $\frac{\text{Total score answered correctly}}{Maximum\ total\ score}$ x 100%
Category: Good ≥50%, Poor <50%

The skills questionnaire consists of 10 statements that only researchers can fill out.
Knowledge scoring formula = $\frac{\text{Number of scores answered correctly}}{\text{Total maximum score}}$ x 100%
Category: Skilled ≥80%, Unskilled <80%

Information through the *BampiApp*, with two meetings within two weeks (40 minutes per meeting) at the pre-test and post-test stages. At the initial meeting, research respondents were asked to fill out a questionnaire as a first step, after which the researcher gave an explanation using *BampiApp* as an educational tool regarding the concept of MP-ASI, variations in types and forms according to the age of the baby, frequency of administration, and the right time to give MP-ASI ASI. The second meeting was used to summarize the contents of the first meeting (evaluation) to measure the increase in respondents' knowledge, attitudes, and skills. The

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collected data were analyzed using the McNemar test to compare the differences before and after the intervention was given. In addition, this research has obtained ethical approval from the Health Research Ethics Committee of the Health Polytechnic of the Ministry of Health, Palangka Raya City with reference number 222/VI/KE.PE/2022.

RESULTS AND DISCUSSION

Data on the characteristics of research respondents were obtained through interviews and filling out questionnaires. A total of 33 mothers of babies became research respondents in Tumbang Samba Village, Central Katingan District, Central Kalimantan. The characteristics of mothers and babies regarding complementary feeding in Tumbang Samba Village are described in Table 1 below:

Table 1. Frequency Distribution of Characteristics of Mothers and Babies in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan (n=33)

Mother's Characteristics	Respondent	
	Frequency	%
Age (year)		
20-24	15	45.0
25-29	10	31.0
30-34	8	24.0
Education		
Elementary School	3	9.0
Secondary School	9	27.0
Senior High School	19	58.0
College	2	6.0
Occupation		
Work	20	61.0
Does not work	13	39.0
Parity		
Primipara	13	39.0
Multipara	20	61.0
Baby's Characteristics	**Respondent**	
	Frequency	**%**
Age (months)		
6-8	22	67.0
9-10	11	33.0
Gender		
Male	15	45.0
Female	18	55.0

There were 33 mothers in this study lived in Tumbang Village, Katingan Tengah District, Central Kalimantan. The characteristics of infant mothers are described in Table 1, showing that 45% are aged 20-24. Age can reflect the extent to which they have experienced various situations in their life. The older a person is, generally they have accumulated more experiences that contribute to their knowledge. These experiences affect a person's thinking level and ability to receive and process information easily. In addition to experience, knowledge can also be obtained through various sources such as education, reading, and social interaction. The more sources of knowledge a person has access to, the more knowledge they can acquire. By having broader knowledge, a person can have a more diverse viewpoint and the ability to understand more complex information[10]. Age can also affect a person's level of thinking. As one age, one's thinking ability develops and becomes more mature[11]. A person's age influences the level of knowledge, level of thinking, and ability to receive and process information[11,12]. According to the Indonesian Ministry of Health (2009), the age range of 20-24 years is included in the late adolescent category[13], but a person's age does not affect a mother's skills in making MP-ASI for her baby.

In Table 1, it is known that the mother's education level was 58% high school. Mother's education level influences knowledge or insights related to nutrition education. The higher the mother's education, the easier it is for the mother to understand the nutrition education provided[4]. Education is a behavior change; the higher a person's education, the wider his knowledge. For mothers who worked as much as 61%, the mother's employment status did not affect the implementation of complementary feeding. This was because the mother was still at home, and paying attention to her child's food was possible. Most babies aged 6-8 months were multiparous, meaning the mother had had children before, and most respondents were female. Baby parity shows the condition of a woman towards the birth of a live baby she has[14]. Parity in this study was divided into primipara (birth of one/first baby) and multipara (birth of baby more than once). Still, parity did not affect the mother's knowledge about complementary foods[15]. Although parity has no effect, there is a difference in the level of knowledge between experienced mothers and those with no experience in making MP-ASI for their babies because there are many known sources of information[11]. Mothers with good experience tend to prepare MP-ASI better, starting from selecting

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ingredients. Food, texture, and frequency. The difference in the level of knowledge of the mother of the baby before and after being given *BampiApp* about giving MP-ASI is explained in Table 2 below:

Table 2. Differences Before and After Nutrition Education Using the *BampiApp* on Mother's Knowledge of MP-ASI in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan (n=33)

Mother's Knowledge Level of MP-ASI	Before		After		p-value
	n	%	n	%	
Good	17	52.0	33	100.0	0.000*
Less	16	18.0	0	0.0	

*McNemar Test

Based on Table 2, it is known that there was an increase in mothers' knowledge about MP-ASI, which was previously 52% to 100% in the good category and in the poor category, which was previously 18% to 0%. The p-value reaching 0.000 (<0.05) indicates a significant difference in the knowledge of mothers in providing complementary feeding (MP-ASI) to babies aged 6-10 months before and after receiving nutrition education through the *BampiApp* application in Tumbang Village Samba, Central Katingan District, Central Kalimantan. Inappropriate eating patterns can be identified as the main factor for growth and development disorders in babies and children aged 6-24 months. As a result, the nutritional needs that should be fulfilled for the baby are not optimally met[2]. The mother's role is important in the growth and development of babies and toddlers, especially regarding knowledge about proper diet and level of care in providing food intake according to age stages[5]. Mother's education level is important in determining babies' nutritional status through supplementary feeding. Mothers with low education levels tend to have a low understanding of infant nutrition[16]. Acceptance of new information is influenced by one's level of knowledge[17], so interesting educational media are needed to increase mothers' knowledge related provision of MP ASI such as the Bompi App. Differences in mothers' attitudes regarding the provision of complementary food for breastfeeding (MP-ASI) before and after receiving education through the *BampiApp* are described in Table 3 below:

Table 3. Differences Before and After Nutrition Education Using the *BampiApp* on Mother's Attitudes about MP-ASI in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan (n=33)

Mother's Attitude about MP-ASI	Before		After		p-value
	n	%	n	%	
Positive	27	45.0	33	100.0	0.000*
Negative	6	55.0	0	0.0	

*McNemar Test

Based on Table 3, it is known that there was an increase in the mothers' attitudes about complementary feeding with the positive category, which was previously 45% to 100%, and the negative category, which was previously 55% to 0%. The result of a p-value of 0.000 (<0.05) illustrates how the attitude of mothers in providing complementary feeding (MP.ASI) to babies aged 6-10 months in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan experienced significant changes after receiving education nutrition through the *BampiApp* application. Mothers with good attitudes regarding complementary foods generally have good knowledge[18]. Knowledge significantly impacts a person's positive or negative attitude towards various aspects, including in the context of complementary feeding. Factors such as support from health workers, family, or the environment close to the mother can also influence changes in attitudes[19]. Parents need to understand that packaged or commercial foods cannot meet the nutritional needs of babies. Parents' attitudes in choosing food intake for babies can form bad habits in the perception of healthy and nutritious MP-ASI. Therefore, the role of parents in reducing commercial feeding and choosing to provide self-cooked MP-ASI at home is important. Providing nutrition education through the Android application platform has the advantage of increasing the level of knowledge and attitude, with varying levels of effectiveness depending on each individual[20]. Everyone who receives the education. Differences in the skill level of mothers regarding the provision of Complementary Food for Breastfeeding (MP-ASI) before and after providing education through BompiApp are shown in Table 4 below:

Table 4. Differences Before and After Nutrition Education Using *BampiApp* on the Skills of Infant Mothers regarding MP-ASI in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan (n=33)

Skills of Infant Mothers about MP-ASI	Before		After		p-value
	n	%	n	%	
Skilled	20	61.0	30	91.0	0.000*
Unskilled	13	39.0	3	9.0	

*McNemar Test

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Based on Table 4 shows an increase in the skills of mothers in providing complementary food for ASI (MP-ASI), with the percentage of skilled mothers increasing from 61% to 91%, while unskilled mothers decreased from 39% to 3%. The p-value of 0.000 (<0.05) describes a significant change in the mother's ability to prepare and provide MP-ASI to babies aged 6-10 months in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan, after receiving nutrition education through BampApp application. Mother's skill in correctly processing complementary foods has an important impact on children's health and growth, which reduces the prevalence of nutritional problems such as stunting. A mother's experience in caring for children influences the nutritional status of children[21]. In recognizing and accepting new foods. So that the baby does not feel bored, the mother needs to provide MP-ASI gradually and with a variety of interesting menu variations. Apart from that, mothers also need to pay attention to cooking and choosing snacks that include vegetables and fruit. Breastfeeding should still be continued until the baby reaches the age of 2[22,23]. The media or visual aids used in counseling greatly influence the effectiveness of nutrition education in changing client behavior[24]. The use of the *BampiApp* as a visual aid involves the senses of sight, hearing, and taste, so it is hoped that the messages conveyed can be more easily understood and practiced at home to provide healthy menus for babies[25].

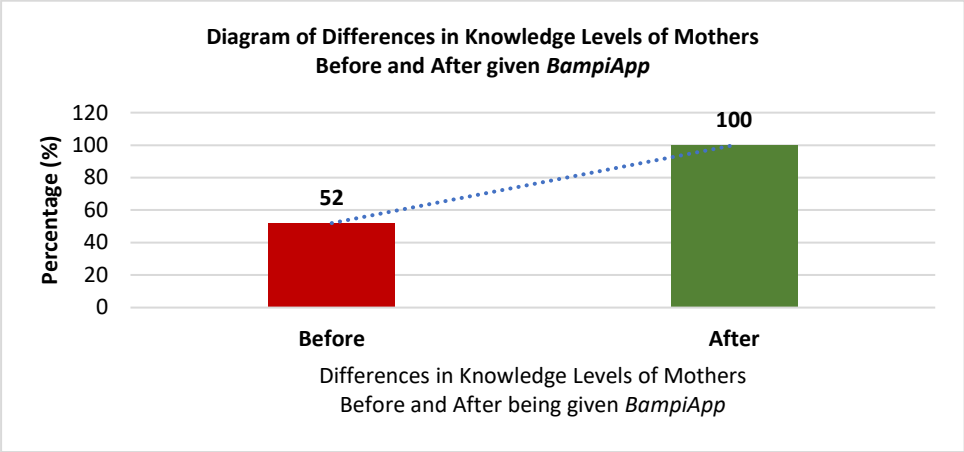

Figure 1. Knowledge of Mothers and Babies about MP-ASI before and after being given the *BampiApp* in Tumbang Samba, Central Kalimantan (n=33)

Based on Figure 1, it is known that there were differences in the level of knowledge of mothers before and after being given *BampiApp* about MP-ASI, which was previously 52% to 100% in the good category. The results of the pre-test before being given the *BampiApp* included several questions that were answered incorrectly by the baby's mother, namely about the forms, stages, and types of MP-ASI. After being given the *BampiApp*, many questions from the post-test were answered correctly. Knowledge of a particular object is very important for behavior change, a complex process. Mothers with good knowledge will influence eating habits and meet the nutritional needs of their children. A person's level of knowledge affects acceptance, information, and newly introduced values[17]. The nutrition education media used is easier to understand and accessed repeatedly, so there is an increase in mothers' knowledge about complementary feeding. The MP-ASI application is an audiovisual media that effectively provides information to everyone[26].

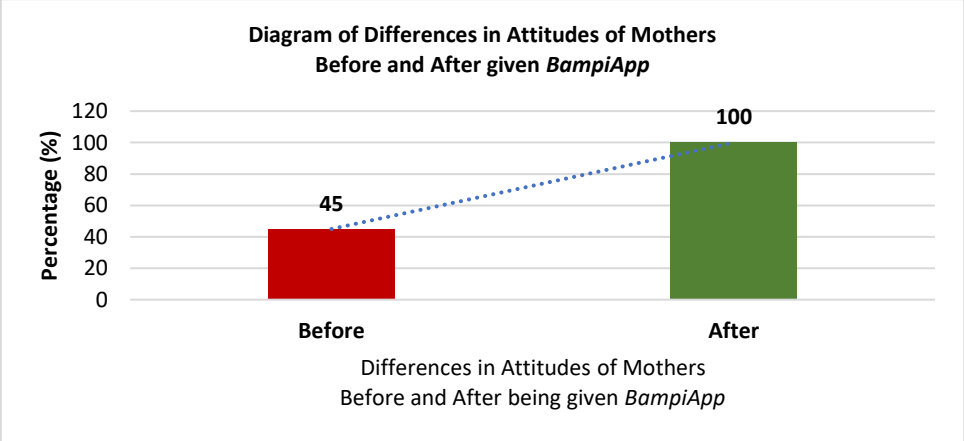

Figure 2. Attitudes of Mothers and Babies about MP-ASI before and after being given the *BampiApp* in Tumbang Samba, Central Kalimantan (n=33)

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Based on Figure 2, it is known that there were differences in the attitudes of mothers before and after being given the SampiApp about MP-ASI, which was previously 45% to 100% in a positive category. Lack of knowledge certainly affected the formation of attitude changes in attitude scores, indicating an increase after being given *BampiApp*. The advantages of nutrition education using the Android application were that it was more effective in increasing knowledge and attitudes with different levels of effectiveness[20]. One's knowledge of an object contains two aspects: positive and negative aspects[17]. The more positive aspects, the better a person's attitude will be.

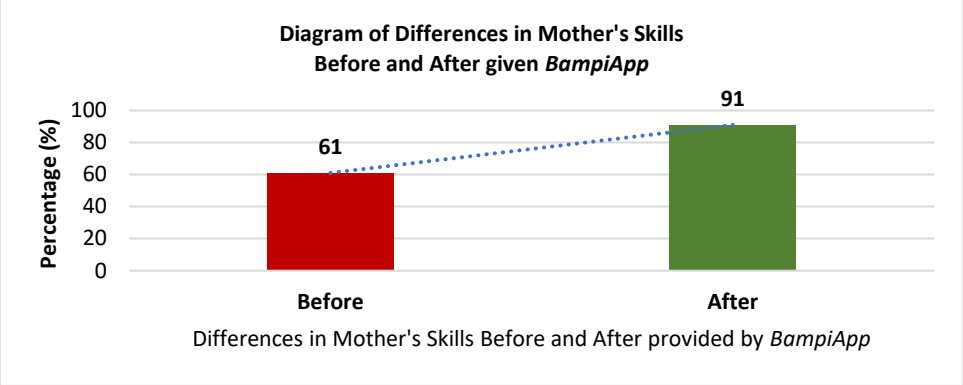

Figure 3. Mother's skills regarding MP-ASI before and after being given the *BampiApp* in Tumbang Samba, Central Kalimantan (n=33)

Based on Figure 3, it is known that there were differences in the attitudes of mothers before and after being given the *BampiApp* about MP-ASI, which was previously 45% to 100% in a positive category. Many of the pre-test questions were answered incorrectly, so after being given BompiApp, many questions from the post-test were answered correctly. Mother's experience in providing MP-ASI influences good and proper MP-ASI processing practices. Mothers with experience with their first babies will understand much more quickly the types and forms of MP-ASI according to the age of their babies[21]. Meanwhile, young mothers having babies for the first time prefer giving instant porridge rather than homemade. A mother's experience in caring for children affects the nutritional status of children. This experience can be obtained from nutrition education and experience from previous births. The importance of a variety of baby food also affects the baby's interest in getting to know his food. MP granting practice. Breast milk is given in stages, and the menu varies so that the baby does not feel bored, starting with how to cook and choosing snacks, including vegetables and fruit. Even though the baby has been given MP-ASI, breast milk is still given until the baby is two years old[22,23].

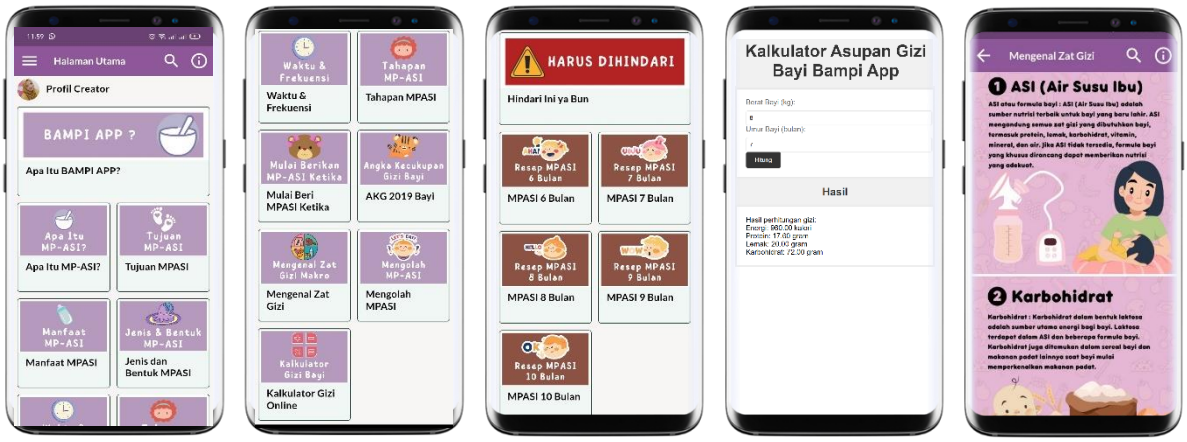

Figure 4. Display of *BampiApp*

Figure 4 displays the contents of the *BampiApp* used by researchers as a research medium. *BampiApp* contains the meaning of MP-ASI, the purpose of giving good MP-ASI, the benefits of MP-ASI for babies, the types and forms of MP-ASI according to the stages of the baby's age, the selected MP-ASI recipe, a nutritional calculator for baby's intake needs, things to avoid in giving MP-ASI, as well as video tutorials on examples of making MP-ASI which have been specifically designed to provide a complete guide on MP-ASI for babies aged 6-10 months in Tumbang Samba Village, Katingan Tengah District, Central Kalimantan.

CONCLUSIONS

Nutrition education through the *BampiApp* has significantly increased mothers' knowledge, attitudes, and skills in preparing complementary foods for babies 6-10 months in Tumbang Samba Village, Katingan Tengah

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District, Central Kalimantan. This research is expected to be a source of comparison or reference for research similar to be done in the future.

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Conflict of Interest and Funding Disclosure

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