Piloting Smartphone Application to Improve Mother's Knowledge of Proper Neonatal Care in Indonesia Anafrin Yugistyowati 1* , Emma Clare Lewis 2 , Dwi Sari Puspaningtyas 2 , Esa Kartika 1 , Arif Sabta Aji 3 , Yhona Paratmanitya 4 , Hamam Hadi 3 , Joel Gittlesohn 2 , Chahya Kusuma 3 1Department of Nursing Science, Faculty of Health Science, University of Alma Ata, Brawijaya, Indonesia; 2Department of International Health, Center for Human Nutrition, Bloomberg School of Public Health, The Johns Hopkins University, Baltimore, USA; 3Graduate School of Public Health Department, Faculty of Health Science, University of Alma Ata, Brawijaya, Indonesia; 4Department of Nutrition Science, Faculty of Health Science, University of Alma Ata, Brawijaya, Indonesia

Abstract BACKGROUND: first 0–28 days a stage infant and In it is that of newborn occur the 6 days life. education neonatal care is needed in this setting.

AIM: This aims pilot smartphone (app) assess in pregnant Indonesian women's knowledge about neonatal care. METHODS: A quasi-experimental conducted November to 2020 31 in each the and groups = Participants pregnant in third who antenatal (ANC) the Health in 1 Yogyakarta, Participants a questionnaire were the Baby (MBC) Data occurred times the of pre-intervention and on of MBC (2) activities WhatsApp during intervention; (3) data was through Google Forms questionnaire.

Data were analyzed using paired t-tests to compare pre- and post-intervention groups, and independent sample t-tests to compare participants' knowledge status between the two groups. RESULTS: Participants on 28.7 years in experimental and years in control group. The majority had a high school level education, were not currently working, got married over the age of 20, and had than children. the there no difference neonatal knowledge of participants the and groups. found health delivered the smartphone app was effective in increasing participants' knowledge about neonatal care (MD = 4.354, p

= 0.030). CONCLUSION: The of Android-based app found be in mother knowledge proper care.

strategies innovative should considered the implementation of health education in ANC programs in Indonesia and beyond.

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Introduction Poor health such premature and birth (LBW), a global today. born, and/ or LBW often with health that be The 24–72 h extrauterine are especially critical [1]. According to the World Health Organization (WHO), 15 million babies or one in 10 are born prematurely every year and this number continues to rise. The current global prevalence of LBW is 15.5%, which to million being with LBW 96.5% which in countries. heavily to annual number global deaths to associated with LBW.

In 2020, around 1/3 of worldwide infant deaths occurred on the day of birth, and almost ¾ occurred the st week life In of all reported infants deaths, around 80% occur within the first days, occur 29 days 11 months, and occur 12–59 months. in Indonesia, most cause neonatal is LBW [2]. Neonates particularly to experiencing poor health outcomes due to physiological changes to organ systems that occur during extrauterine adaptation period Neonates proper neonatal from around during adaptation [4].

care refers to carried by workers families maintain neonate's health prevent issues arising [6]. neonatal involves family, the and is, therefore, fundamental that education on best neonatal care practices be accessible [5], [7]. 175 Lack of maternal knowledge regarding newborn care has

significant on mortality morbidity A study in Pakistan that average 's of care a of out 11.00 About of participants this study demonstrated knowledge skin skin care; knew right for newborn's bath; demonstrated knowledge early initiation of breastfeeding; 57.6% had knowledge of accep table foods; 55.6% participants answered when about colostrum to the study only of were of umbilical care, although 73.4% knew that breastfeeding should be given demand; 51.0% the duration exclusive breastfeeding.

Overall, this recent study helped to determine that certain aspects of neonatal care are still widely by such education beginning antenatal (ANC) and the of pregnancy be accessible to all mothers before the birth of their newborn. Community Centers as of most public service in These serve functions, including fostering community participation in the health sector carrying comprehensive, and sustainable activities The Health is to in the implementation health-care so to a impact public in communities which they are located [10]. One of the principle missions of the Community Health Center is to provide education to women the period set by the Ministry of Health of the Republic of Indonesia [6].

Educational help to understand material to Educational media include printed, and media. display images or has shown enhance learning process compared to using only written media [11], [12]. Fortunately, the development and ubiquity of technology today it to several of educational to accessed one Smartphones particular serve a for educational combining audio-visuals, and writing [9], [13]. Several have benefits use educational [12]. example, et al. that use effective increasing knowledge and alertness of pregnant women increased risk of having a preterm birth [13].

In addition to ubiquity, can used anywhere at time learning referred as learning m-learning) Information Communication survey data in Indonesia 2017 show that 65.09% of Indonesian women have used smartphones [15]. Despite this, there is limited on use Android- based applications for care education. According to the International Data Corporation, Android 82.8% the market while iOS only holds 13.9%. In Indonesia, as of January 2020, were Android-based users iOS-based users, making Android more choice the intervention.

Partnership the 1 Community Health Center, Bantul Regency, Yogyakarta Province, the Ministry Health, the study conducted examine effectiveness using Android-based app an medium improving women's knowledge about proper neonatal care. Methods Study design The study a design non-equivalent and groups to determine the effectiveness of the intervention in experimental compared the group. experimental received using My Care app an based and control received booklet as the alternative educational medium. Study sample This was in rural namely, the 1 Health Center, which is located in Bantul

Province.

study included women received at Banguntapan Health 1. diagram of selection research is in Fig ure 1 . criteria (1) in third trimester pregnancy, undergoing at Banguntapan Health 1, having access to an Android-based smartphone, and (4) being willing to participate. Exclusion criteria were: (1) Having a that incompatible the operating and already received education from health workers about neonatal care.

We the and sample size determination formula, with a degree of confidence of and of of From total population t4 a of participants was [16]. were divided either experimental (n 31) the group (n = 31) using the purposive sampling technique. In context, from Village 176 https://oamjms.eu/index.php/mjms/index Baturetno made the group; while participants from Banguntapan Village and Jambi Village made up the control group. Questionnaire instrument Data collected a neonatal care questionnaire by researchers administrated Google The includes regarding neonatal such eye, ear, umbilical and care, well bathing, changing, breastfeeding babies, and giving immunizations.

There are a of statements, favorable 7 for which scoring relies on the Guttman scale. Each correct answer 5 while wrong earns 0 higher score, higher knowledge level the questionnaire originally developed use the Primipara Mother's Knowledge of Baby Care in Situmeang Habinsaran, Sipoholon study, and been to accep table validity (0.631) and reliability (0.681) [17]. App development In present the group downloaded and installed an Android-based smartphone app that contains content regarding neonatal care in the form of text, images, and videos.

The control group was given booklets similar content to the app. The app in present was by present team included pediatric practitioner academic faculty in fields pediatric science information The was programmed the model. is acronym "Analyze, Develop, and [18], [19]. app stages were (1) in form identifying desired uses the as as needs non-functional (2) in of process translating identified the stage the of the using case diagram s, diagram s, and chart s; development the based on Massachusetts of (MIT) app from MIT; implementation participants in the experimental group use the app; and (5) where in experimental group a on knowledge of care use the The app primarily video and accompanied by pictures and written steps.

Data collection st was the same as that presented in the MBC app. On 2 nd day, activities conducted WhatsApp chats the group included: Helping participants they difficulties the educational (2) that had all educational (3) motivation mothers; (4) that obtain about care from instruments In control follow-up activities conducted WhatsApp chats ensure used booklet and other media. Use of the MBC app lasted approximately

45 min research were the opportunity to study the content at least 2 times, namely, on the 1 st day and the 2 nd day at follow-up (Fig ure 1).

On the 3 rd day, post-intervention data collection was through Forms Participants again with so as limit issues arising completing questionnaire (Fig ure 1). Selection of participants (n = 69) Does not meet the inclusion criteria (n = 7) Participants who meet the criteria and agree to participate (n = 62) Distribution of participants based on village origin Experimental group using Android-based media (n = 31) Control group using booklet (n = 31) Pre-intervention (n = 31) Pre-intervention (n = 31) Educational process using the booklet (n = 31) Educational process using the MBC app (n = 31) Follow up (n = 31) Follow up (n = 31) Post-intervention (n = 31) Post-intervention (n = 31) Figure 1: Flow diagram of participants for the <mark>experimental and control groups</mark> <mark>Open Access Maced J Med Sci. 2022 Jan 03;</mark> 10(T8):174-179. 177 Data analysis Data then to descriptive data the of in groups.

of characteristics between two was out an independent t-test one-way for continuous and Chi-square for data. t-tests performed compare pre- and data in group, an samples was to compare maternal between two groups. Ethical approval This research was reviewed and approved by the Ethics Committee of the <mark>Faculty of Health Sciences,</mark> Alma Ata on 2, (number: XI/1002/EC/2019). Participants were given an explanation of purpose course the and they agreed to participate, they then signed the written consent form.

the process, was that the personal would kept confidential, no effects be caused participating, that participant able to withdraw from the <mark>study at any time.</mark> Results Among sample, average of participants 28.7 the group 29.9 the group. majority participants had a school education, not currently had married the of and more two at time the There no difference the groups age, occupation, age marriage, parity (Table 1). no difference detected the two regarding care of participants baseline on pre-intervention questionnaire (Table 2). The knowledge of in experimental 73.55 = at pre- intervention time point and 82.74 (SD = 7.83) at the post- intervention point.

results the t-test analysis that an smartphone app as an educational medium significantly increased knowledge = Table 3). For participants the group an knowledge of (SD 8.10) intervention 78.38 = post-intervention, with results the t-test significant (p = 0.025). this that use of booklet the group significantly increased knowledge, was higher average increase in knowledge among the experimental group <mark>compared to the control group.</mark> Table 3: Change in participants' knowledge Variables Pre-intervention Post-intervention p Mean SD Mean SD Knowledge Experimental group Control group 73.55 76.61 7.65 8.10 82.74 78.38 7.83 7.57 0.000 0.025 An samples was to the of participants the group the group intervention. found significant in knowledge the

groups determined that use smartphone was effective for knowledge to booklet (p = 0.030; mean difference = 4.354) (Table 4).

Table 4: Difference in knowledge post-intervention Variables Experimental group (n = 31) Control group (n = 31) Mean difference p Mean SD Mean SD Knowledge of neonatal care 82.74 7.83 78.38 7.57 4.35 0.030 Discussion The study to an based app an medium increasing pregnant knowledge about care. of smartphone was compared a traditional booklet by Community Health Centers to provide education. Table 1: Demo graphic data of the experimental group and control group Variables Experimental group (n = 31) Control group (n = 31) p n % n % Age (mean, SD) 28.7 6.21 29.9 6.19 0.107 >35 5 16 9 29 20–35 25 81 22 71 <20 1 3 0 0 Educations College 12 39 8 26 0.518 Senior high school 15 48 20 65 Junior high school 4 13 2 6 Elementary school 0 0 1 3 Professions 0.736 Currently works 13 42 11 35 Does not work 18 58 20 65 Age of marriage 0.759 >20 25 81 29 94 <20 6 19 2 6 Parity status 0.255 >2 13 42 20 65 1 6 19 5 16 None 12 39 6 19 Table 2: Participants' knowledge homogeneity test pre-intervention Variables Experimental group (n = 31) Control group (n = 31) t p Mean SD Mean SD Knowledge of neonatal care 73.54 7.65 76.61 8.10 0.131 0.948 178 https://oamjms.eu/index.php/mjms/index Data demonstrated although both smartphone and were in increasing 's the increase in was higher the experimental group compared to the control group.

Health involves conscious planned to knowledge develop one's life skills toward living a healthy lifestyle [12]. The media which education delivered influence this process [20]. Importantly, health education that mixed in form text, and images can aid in a person's learning process [21]. In digital era, many health app have been developed as educational Research Ratnasari a pre-pregnancy app that replace flip chart s or leaflets for counseling health care workers. This facilitates increases about pre-pregnancy [22].

In with present the of educational can be from the of conducted Jiao et al. on psychoeducation web-based In 2019 study, et al. that media maternal and the of postnatal depression compared to the control group given traditional psychoeducation [23]. More study about health education slide more to the level of breast cancer knowledge for students [24]. In addition, our results are in line with research conducted Kim et al. found providing education smartphones awareness about factors premature among women, led an in number visits to facilities consultation health workers [13].

use android for education for pregnant women also shows an influence on motivation pregnant in for babies [25]. The use of smartphones as an educational medium has various advantages, including ease of use, appealing and ability use at time and in any location [26]. Based the of present coupled with previous research, the authors believe

that software-based media thoughts, feelings, interests can the process more appealing.

With the current technological advancements, is to educational content the of media through smartphone We that MBC motherknowledge neonatal and hypothesized increased would increased confidence caring her In we work global in neonatal and especially the of mobile technology. One worth was there a lack of monitoring of participant's use of the MBC app during present Monitoring only out text sent WhatsApp chats. is for due not whether used app intended. The of purposive sampling method and the quasi-design of the study considered of groups not significant different at baseline for support. Conclusion Smartphones be an important for neonatal due to ease convenience use to traditional methods.

use smartphones may the process appealing mothers can to typical such physical to Community Center Future should the effectiveness smartphone like MBC on larger It our that can be and to in process of health for care Community Centers Indonesia similar settings. Acknowledgments The would to the Ata University, 1 Health all for contribution this and the John Hopkins University for their assistance on writing editing manuscript the Class Professor Program.

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