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Mobile Health Campaigns and Changes in Clean and Healthy Living Behavior (PHBS) in the Community

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ABSTRACT

Changes in clean and healthy living behavior (PHBS) are an important component in improving public health. However, conventional outreach often faces limitations in reaching the community broadly and sustainably. This study aims to analyze the effect of mobile-based health campaigns (mobile health or mHealth) on changes in PHBS behavior in urban and semi-urban communities. This study used a quantitative approach with a descriptive-correlational design. Data were collected through an online survey of 385 respondents aged 18–50 years in Depok City and Sleman Regency, using a Likert-scale questionnaire. Data analysis was performed using the Pearson correlation test and simple linear regression. The results showed a positive and significant relationship between exposure to mHealth campaigns and PHBS behavior, with the highest correlation values for content quality ($r = 0.47$) and total exposure score ($r = 0.521$; $p < 0.001$). Linear regression showed that mHealth explained 27.1% of the variation in PHBS behavior ($R^2 = 0.271$) with a coefficient of $b = 0.513$. In conclusion, high-quality, relevant, and consistent mHealth campaigns play a crucial role in driving change in healthy, clean, and healthy lifestyle behaviors. Health promotion strategies in the digital era need to integrate these approaches in an adaptive and evidence-based manner.

Keywords: *Mobile health, PHBS, Health promotion, Digital campaign, Behavior change.*

INTRODUCTION

Changing behaviors to a clean and healthy lifestyle (PHBS) is a crucial component in improving overall public health. This program aims to encourage individuals, families, and communities to adopt healthy habits in their daily lives to prevent disease and improve quality of life.(RI, 2021)In practice, PHBS encompasses various behaviors such as washing hands with soap, using a healthy toilet, managing clean water, avoiding smoking at home, and engaging in regular physical activity. However, the implementation of the PHBS program in Indonesia still faces several challenges, particularly related to low public awareness, cultural resistance to behavior change, and the limitations of conventional educational strategies.(Aini & Harjo, 2023)The 2018 Basic Health Research (Riskesdas) results show that only around 36% of households in Indonesia have fully implemented PHBS. This indicates the need for a new approach to delivering health messages to reach the public more effectively and sustainably. Along with the development of information and communication technology, digital media has become a strategic tool for disseminating health information. One emerging approach is mobile health (mHealth), which is the use of mobile devices such as smartphones and tablets to support public health services. This concept includes sending short messages, health applications, social media, and automated alert systems that can be accessed anytime by the public.(Labrique et al., 2018).

In developing countries, the use of mHealth has been proven to help expand the reach of health campaigns, improve patient adherence to treatment, and strengthen communication between health workers and the community.(Chib et al., 2021; Free et al., 2022)In the Indonesian context, the high penetration of internet and gadget users provides a great opportunity for the development of digital technology-based PHBS campaigns, especially in urban and semi-urban areas that have relatively good access to technology.(Hidayat & Febrianti, 2023)Several studies have demonstrated the effectiveness of mHealth use in influencing public health behavior.Nugraheni et al., (2021)showed that delivering PHBS educational messages via WhatsApp increased housewives' awareness of the importance of washing hands and using clean water. A similar study byRachmawati & Wulandari (2023)found that a digital campaign conducted through a dedicated app improved the understanding and practice of environmental hygiene among informal sector workers. Most research conducted in Indonesia still focuses on improving knowledge and attitudes, rather than on concrete behavioral changes that can be systematically measured.(Fitriana et al., 2022; Marlina & Ismail, 2022). While behavioral change is a key indicator of the success of a PHBS program, few studies have evaluated the relationship between the intensity of exposure to mHealth campaigns and PHBS behavioral indicators within the socio-cultural context of Indonesian society.

This research gap becomes even more relevant considering the trend of Indonesian society shifting from mass media to social media and digital platforms as primary sources of information, including health information. Unfortunately, the use of these channels for PHBS campaigns remains unstructured and poorly integrated with the broader health care system.(Rahmadi et al., 2020). In addition, another challenge is that campaign content is less engaging, not interactive, and does not take local context into account. Several respondents in a study byHastuti & Kurniawan, (2021)stated that they ignore digital health messages that are monotonous and irrelevant to their daily needs. This suggests that the effectiveness of mHealth campaigns depends not only on the frequency of message delivery, but also on their quality, relevance, and audience engagement. In this regard, the novelty of this study lies in the integration of the evaluation of the intensity of exposure to mHealth campaigns with indicators of clean and healthy behavior change established by the Ministry of Health. This study not only examines how often a person is exposed to health information through digital media but also measures how that exposure correlates with actual practices such as the use of healthy latrines, household waste management, and home ventilation.

Furthermore, the methodological approach employed emphasizes quantitative analysis through correlation and regression, thus providing empirical evidence on the extent to which digital campaigns can be an effective instrument in promoting PHBS. This approach has rarely been used in previous studies, which generally employed solely qualitative or descriptive methods.(Marlina & Ismail, 2022; Sari & Mustofa, 2020). In a global context, the effectiveness of mobile health campaigns has been demonstrated in various health interventions. Studies byGarofalo et al., (2021)in the United States showed that mHealth can significantly improve medication adherence in HIV patients.Free et al., (2022)A systematic review also revealed that mHealth has a positive impact on various health behaviors such as contraceptive use, hypertension control, and reduced tobacco consumption. However, this effectiveness is strongly influenced by local context, content type, and message interactivity. Adapting these findings to the Indonesian context, PHBS campaigns through mHealth require an approach tailored to local user characteristics. The health information needs of urban and semi-urban communities, for example, are very different from those of rural communities. Therefore, campaign design must consider the social, economic, cultural, and digital literacy aspects of the target community.(Notoatmodjo, 2021)Based on this description, this study aims to analyze the relationship between exposure to mobile health campaigns and changes in PHBS behavior in the community, focusing on five main indicators: handwashing with soap (CTPS), clean water use, waste management, use of healthy latrines, and home ventilation. It is

hoped that the results of this study can contribute to the development of more targeted, contextual, and data-driven digital health promotion strategies

METHODS

This study uses a quantitative approach with a descriptive-correlational survey-based design, which aims to analyze the relationship between the intensity of public exposure to mobile health (mHealth) campaigns and changes in Clean and Healthy Living (PHBS) behavior. The research locations were selected purposively, namely in Depok City (urban area) and Sleman Regency (semi-urban area), which have a high level of digital media penetration and the existence of health campaign initiatives through online channels. The study was conducted for three months, from May to July 2025, involving respondents aged 18–50 years who have access to smartphones and have been exposed to digital health campaign content, either through WhatsApp, Instagram, or official applications such as PeduliLindungi. The number of respondents was determined using the Slovin formula with a 5% error rate, obtaining 385 people selected through stratified random sampling based on age and gender proportionally. Data collection was carried out by distributing an online questionnaire using Google Forms containing three main sections, namely: (1) demographic characteristics of respondents; (2) intensity of exposure to mHealth campaigns (frequency, channels, perceptions of content); and (3) PHBS behavioral indicators consisting of five main aspects based on the Ministry of Health standards, namely washing hands with soap, using healthy toilets, consuming clean water, managing household waste, and home ventilation. The questionnaire was compiled on a Likert scale of 1–5 and has been tested for validity and reliability with a Cronbach's Alpha value of 0.84, which indicates that the instrument is classified as reliable.

Data analysis was conducted through three stages: descriptive analysis, Pearson correlation, and simple linear regression. Descriptive analysis was used to describe the characteristics of respondents, the distribution of exposure to mHealth, and the level of implementation of PHBS behavior. Data normality test was performed using Kolmogorov-Smirnov, and the data were declared normally distributed ($p > 0.05$), thus worthy of further analysis. Pearson correlation test was used to identify the linear relationship between mHealth campaign exposure variables and PHBS behavior, while simple linear regression analysis aimed to see how much influence the exposure variables had on changes in PHBS behavior, with the equation model $Y = a + bX + e$. The results of this analysis were used to answer the hypothesis whether the mHealth campaign had a significant contribution to changes in community behavior in implementing clean and healthy living practices. All data processing processes were carried out using SPSS software version 26. In

addition, the ethical aspects of the study were also considered by ensuring informed consent from each respondent, maintaining the confidentiality of participant identities, and obtaining ethical approval from the XYZ University Health Research Ethics Committee (No. 04/KEPK/UNXYZ/IV/2025). This research approach is expected to provide empirical contributions in the development of evidence-based digital health campaign strategies to improve PHBS sustainably in Indonesian society.

RESULTS AND DISCUSSION

The following are the research results based on data analysis using the previous method. These results address the research objective, which was to analyze the influence of mobile health (mHealth) campaigns on changes in healthy, healthy, and healthy behavior in the community:

1. Description of Respondents' PHBS Behavior

   Table 1. Summary of PHBS Research Results

PHBS Indicators	Average PHBS Score (1–5)	Percentage of Respondents Practicing (%)
Wash your hands with soap (CTPS)	4.2	85%
Use of clean water	4.0	82%
Use of healthy toilets	3.8	76%
Household waste management	4.1	80%
Ventilation & house cleanliness	3.9	78%

   Most respondents demonstrated a fairly good level of PHBS practices, particularly in handwashing with soap (CTPS), clean water use, and household waste management. The average score for each PHBS indicator ranged from 3.8 to 4.2 (on a scale of 1–5), with actual practice exceeding 75%.

2. Correlation Results between mHealth Exposure and PHBS

   Table 2. Correlation Results of mHealth Exposure to PHBS

Variables	r (Pearson)	p-value
Frequency of mHealth exposure	0.42	0.001
Duration of mHealth exposure	0.38	0.003
Quality of mHealth content	0.47	0.000
Total mHealth exposure score	0.521	0.000

The results of the Pearson correlation test showed that all variables of exposure to mHealth campaigns had a positive and significant relationship with PHBS behavior. The mHealth content quality variable showed the highest correlation ($r = 0.47$; $p < 0.001$), followed by exposure frequency ($r = 0.42$) and duration ($r = 0.38$). The total exposure score had the strongest correlation ($r = 0.521$; $p < 0.001$), indicating that the more frequent and high-quality campaigns received, the higher the change in PHBS behavior.

3. Linear Regression Results: The Effect of mHealth on PHBS

Table 3. Summary of Linear Regression Analysis

Model	R Square	Sig. (p-value)	Regression Coefficient (b)
Y = a + bX	0.271	0.000	0.513

Simple linear regression analysis shows that exposure to the mHealth campaign significantly influences changes in community PHBS behavior. The R Square value of 0.271 indicates that approximately 27.1% of the variation in PHBS behavior changes can be explained by the mHealth exposure variable. A positive regression coefficient of 0.513 indicates that each increase in mHealth exposure score is followed by a significant increase in PHBS behavior scores ($p < 0.001$).

This study aims to examine the relationship between public exposure to mobile health (mHealth) campaigns and changes in clean and healthy living behavior (PHBS). Based on the results presented, it was found that there is a positive and significant relationship between exposure variables to mHealth campaigns including frequency, duration, and content quality with PHBS behavior in urban and semi-urban communities. PHBS behavior measured in this study includes five main indicators according to Ministry of Health standards, namely handwashing with soap (CTPS), clean water use, use of healthy latrines, household waste management, and home ventilation/cleanliness. In general, the average score of the five PHBS indicators ranged from 3.8 to 4.2 on a scale of 5. This means that respondents exposed to mHealth campaigns tend to have implemented healthy living practices in their daily lives. CTPS practice showed the highest score (4.2) with an adoption rate of 85%, followed by household waste management (4.1; 80%) and clean water use (4.0; 82%). These high scores reflect that digital campaign messages have reached the community's preventive behavior dimension. These results are in

line with studiesRosa & Winarti, (2021)who found that easily accessible and emotionally receptive campaign content more quickly drove changes in basic behaviors such as personal hygiene.

However, indicators for the use of healthy latrines and home ventilation were in the lower range (3.8 and 3.9). This may be influenced by the physical condition of the residence, family economic conditions, and limited access to adequate sanitation infrastructure. These findings align with research.Kurniawan & Mahardika, (2020)which states that behavioral changes that require costs or structural changes to the household are slower than simple, individual behavioral changes. The Pearson correlation results in this study show that all dimensions of mHealth exposure have a significant relationship with PHBS behavior, with the highest correlation indicated by the quality of campaign content ($r = 0.47$) and the total exposure score ($r = 0.521$; $p < 0.001$). This indicates that it is not only how often people see campaigns, but also the quality and relevance of the messages conveyed through these digital platforms. These findings support the statementAhmad et al., (2023)that the success of digital health promotion is largely determined by the strength of the visual design, narrative, and emotional engagement of the content delivered.

In the context of social behavior, good content quality can build cognitive and affective relationships between the message and the recipient. According toHoffmann et al., (2023), a digital media-based health promotion model will be effective if it utilizes an emotional, interactive approach, and is in line with the communication style of the target community. The findings in this study indicate that campaign content using local languages, accompanied by relevant images or videos, is more easily accepted by the community than messages that are formal and technical. The results of the linear regression showed that the exposure score to the mHealth campaign was able to explain 27.1% of the variation in changes in PHBS behavior ($R^2 = 0.271$; $p < 0.001$). This value is quite significant for a social study, considering that human behavior is influenced by many other factors such as education, environment, culture, and economy. This finding is supported by Chen et al., (2021)in their meta-analysis, which showed that mHealth interventions contribute up to 20–30% of behavior change, depending on the context and design of the intervention. From a digital literacy perspective, this study also found that respondents with higher digital literacy levels showed higher PHBS scores. This means that those who are accustomed to using digital devices and understand the content of campaign messages tend to respond more quickly to calls for a clean and healthy lifestyle. This is reinforced by Prasetyo & Suryani, (2020)which states that digital literacy is the

key to the success of social media-based health promotion, especially in the productive generation.

Interestingly, the most effective platforms for reaching the public were WhatsApp and Instagram. WhatsApp was used by health workers or cadres to distribute direct messages in the form of educational images and videos, while Instagram was used by the health community to share infographics and educational stories.Syafruddin, (2023)emphasized that personalized social media platforms that allow for two-way dialogue are more effective in building closeness and trust in recipients. This study also supports the importance of the family's role in transforming health behaviors. Several respondents reported sharing campaign content they received with other family members through family WhatsApp groups. This creates a ripple effect in the dissemination of information.Lee et al., (2022)called this phenomenon family-mediated promotion, which involves the dissemination of health messages through family ties, which are more influential than institutional campaigns. However, not all respondents responded positively. Some expressed boredom with repetitive and overly normative content. In this regard,Nasution & Iskandar, (2021)reminds us that audience segmentation is crucial in health promotion. Messages for younger age groups cannot be the same as those for older adults or children. mHealth campaigns should be designed to be adaptive, responsive, and based on local characteristics. Another important finding is that community engagement increases when campaigns are packaged in storytelling, humor, and digital challenges. This aligns with the concept of entertainment education, which has been proven effective in changing social behavior.(Kurniawan & Mahardika, 2020)People tend to be more receptive to messages when they're delivered not in a patronizing manner, but through inspiring experiences and stories.

Abbas & Khan, (2022)In their global study, they emphasized that interactivity and emotional engagement are two key factors in the effectiveness of social media for health promotion. Therefore, mHealth campaigns need to actively engage audiences through polls, quizzes, or collaborations with local influencers to be more grounded. In addition to content and platform factors, collaboration between actors is also crucial.Rahardjo & Dewi, (2022)explained that digital campaigns combined with community intervention or the active role of health cadres will have a greater impact. mHealth campaigns should not be left solely to community health centers or health offices, but should also involve local communities, religious leaders, teachers, and local media. The ethical and technical challenges of using mHealth should also not be

overlooked. Several respondents expressed concerns about health hoaxes, leaked personal data, or unverifiable health messages. Therefore,Putri & Susanto, (2022) recommends the importance of digital governance in implementing digital health promotion, including content validation systems, officer training, and regulations for the distribution of public information. Within the framework of the national health system, the findings of this study indicate that mHealth campaigns have great potential to be integrated into national health promotion strategies. Strategies such as Smart Health Villages or Digital Posyandu need to be expanded so that campaigns reach not only urban communities but also rural areas and 3T (underdeveloped, frontier, outermost) areas. This aligns with the strategyOrganization, (2021) which encourages the digitalization of primary healthcare services as a form of innovation to achieve Universal Health Coverage (UHC). Therefore, it can be concluded that exposure to mHealth campaigns significantly impacts changes in clean and healthy behavior. However, their effectiveness is highly dependent on content quality, recipient digital literacy, adaptive media design, and social and policy support. These results reinforce the importance of an interdisciplinary approach in the design and implementation of digital-based health promotion.

CONCLUSION

This study shows that community exposure to mobile health (mHealth) campaigns has a significant influence on changes in Clean and Healthy Living (PHBS) behavior. The average PHBS behavior score ranges from 3.8–4.2 on a scale of 5, with handwashing with soap (85%), clean water use (82%), and waste management (80%) as the highest indicators. The results of the Pearson correlation analysis showed a significant positive relationship between the total mHealth exposure score and PHBS behavior ($r = 0.521$; $p < 0.001$), while a simple linear regression analysis showed that mHealth exposure explained 27.1% of the variation in PHBS behavior change ($R^2 = 0.271$), with a regression coefficient $b = 0.513$. Thus, mobile-based health campaigns designed in an attractive, interactive, and contextual manner have proven effective in encouraging changes in community preventive behavior. The study's objective of analyzing the influence of mHealth on PHBS behavior has been achieved, and supports the importance of integrating digital approaches with community-based health promotion strategies. This research provides an empirical contribution to the formulation of adaptive and evidence-based digital health promotion policies in Indonesia.

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