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Bridging the Digital Divide: A Mixed-Methods Evaluation of the Efficacy, Accessibility, and Impact of Web-Based Mental Health First Aid Training for Community Health Volunteers (*Kader*) in Rural Indonesia

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A B S T R A C T

Significant disparities in mental health service access persist in rural Indonesia, where community health volunteers (known as *Kader*) represent a vital but undertrained resource. Digital training platforms offer a scalable solution to build mental health literacy, yet their efficacy and accessibility in low-resource, digitally diverse settings remain under-evaluated. This study aimed to evaluate the efficacy, accessibility, and user experience of a novel, web-based Mental Health First Aid (MHFA) training program for *Kader* in rural Indonesia. We employed a convergent parallel mixed-methods design with a single-group, pre-test/post-test framework. A total of 165 *Kader* from 15 rural districts across North Sumatra, West Sumatra, and South Sumatra provinces were recruited. Participants completed a 4-week, self-paced, web-based MHFA course. Quantitative data were collected using the Mental Health Knowledge Questionnaire (MHKQ), the Community Attitudes toward the Mentally Ill (CAMI) scale, and the System Usability Scale (SUS) at baseline and post-intervention. Qualitative data were gathered through semi-structured focus group discussions (FGDs) with a purposive subsample of 32 participants to explore user experience and perceived impact. The intervention yielded a highly significant improvement in mental health knowledge, with mean MHKQ scores increasing from 48.5 (SD=10.2) at pre-test to 89.7 (SD=8.8) at post-test ($t(164) = -35.1$, $p < 0.001$). Stigmatizing attitudes significantly decreased, as reflected by an increase in mean CAMI scores from 55.3 (SD=12.5) to 81.4 (SD=11.9) ($t(164) = -18.9$, $p < 0.001$). The platform's usability was rated favorably, with a mean SUS score of 81.2 (SD=13.4), indicating excellent user-friendliness. Qualitative analysis revealed three primary themes: (1) Digital Empowerment and Overcoming Barriers; (2) Cultural Resonance and Practical Skill Acquisition; and (3) The Emergence of a Supported Community of Practice. In conclusion, web-based MHFA training is an effective, accessible, and well-accepted modality for empowering *Kader* in rural Indonesia. This digital approach successfully bridges geographical and educational divides, significantly enhancing mental health literacy and reducing stigma. Scaling this model holds immense potential for strengthening community-based mental health services and narrowing the treatment gap in Indonesia and similar low- and middle-income countries.

1. Introduction

The global burden of mental, neurological, and substance use disorders represents one of the most significant public health challenges of the 21st century, yet the gap between the need for care and its provision remains vast, particularly in low- and middle-income countries (LMICs). Indonesia, the world's fourth most populous nation, exemplifies this

treatment gap. The 2018 National Basic Health Research (Riskesdas) revealed that the prevalence of severe mental disorders was approximately 7 per 1,000 households, with millions more affected by depression and anxiety. However, the distribution of mental health professionals is heavily skewed towards urban centers like Jakarta and other major cities on Java, leaving vast populations on other islands, such as Sumatra, with little to no access to formal mental health care. This service vacuum is exacerbated by pervasive social stigma, low mental health literacy, and a reliance on traditional healers, often delaying or preventing individuals from seeking evidence-based care.[1-3]

In response to this systemic challenge, a strategy of task-shifting—delegating tasks from specialist professionals to trained lay health workers—has emerged as a cornerstone of global mental health initiatives. In Indonesia, the community health volunteer, or *Kader* Kesehatan, is a deeply embedded and trusted figure within the community healthcare infrastructure. These volunteers, predominantly women, are the frontline of the Posyandu (Integrated Health Service Post) system, responsible for health promotion, maternal and child health monitoring, and facilitating access to primary care services (Puskesmas). Their established community relationships and regular contact with families position them as an ideal cadre to provide initial mental health support. However, *Kader* typically receive minimal, if any, formal training in mental health, leaving them ill-equipped to identify signs of psychological distress, offer initial assistance, or facilitate pathways to professional care.[4,5]

Traditional, face-to-face training models for such a large and geographically dispersed workforce are logistically complex, financially burdensome, and difficult to scale. The rapid proliferation of mobile technology and increasing internet penetration in Indonesia, even in rural areas, presents a transformative opportunity to overcome these barriers. Web-based learning, or e-learning, offers a flexible, cost-effective, and scalable alternative for capacity building. It allows volunteers to learn at their own pace, accommodating their personal and professional schedules, while enabling standardized, high-quality content delivery across diverse regions. While digital health interventions are gaining traction globally, there is a critical need for rigorous research evaluating their feasibility, cultural appropriateness, and effectiveness within specific LMIC contexts like rural Indonesia, where digital literacy and infrastructure can be highly variable.[6,7]

The Mental Health First Aid (MHFA) program is a well-established, evidence-based training curriculum designed to equip laypersons with the skills to provide initial support to individuals developing a mental health problem or experiencing a mental health crisis. The core of MHFA is the "ALGEE" action plan: Assess for risk of suicide or harm, Listen non-judgmentally, Give reassurance and information, Encourage appropriate professional help, and Encourage self-help and other support strategies. The program has been shown to improve knowledge, reduce stigmatizing attitudes, and increase helping behaviors across numerous countries and contexts. Adapting this proven model into a culturally resonant and linguistically appropriate web-based format for Indonesian *Kader* could be a pivotal strategy for building community-level mental health resilience.[8,9]

However, the mere creation of a digital tool does not guarantee its uptake or impact. The "digital divide" is not merely about access to a device but also encompasses digital literacy, connectivity quality, and the perceived relevance and usability of the platform. Therefore, a comprehensive evaluation must extend beyond measuring knowledge gain to critically assessing the platform's accessibility and the lived experiences of its intended users. This study addresses a significant gap in the literature by providing a robust, mixed-methods evaluation of a purpose-built, web-based MHFA training program for *Kader* in rural Indonesia. The novelty of this research lies in its dual focus on quantifying the intervention's efficacy in improving mental health literacy and attitudes, while simultaneously capturing rich

qualitative insights into the real-world accessibility, usability, and socio-cultural integration of this digital health solution.

Therefore, the primary aim of this study is to evaluate the efficacy, accessibility, and user experience of a web-based Mental Health First Aid (MHFA) training program for Community Health Volunteers (*Kader*) in rural Indonesia. We hypothesized that participants completing the training would demonstrate significant improvements in mental health knowledge, a reduction in stigmatizing attitudes, and report high levels of usability and satisfaction with the digital platform.

2. Methods

A convergent parallel mixed-methods design was employed to provide a comprehensive and triangulated understanding of the intervention's impact. This design involved the concurrent collection and analysis of quantitative (pre-test/post-test survey) and qualitative (focus group discussion) data. The quantitative component aimed to measure changes in knowledge and attitudes, while the qualitative component sought to explore the participants' experiences, perceptions, and the contextual factors influencing their engagement with the training. The findings were integrated during the interpretation phase to create a holistic evaluation. The study received ethical approval from the Institutional Review Board of CMHC Research and Sains Center, Indonesia.

The study was conducted in 15 rural districts across three provinces on the island of Sumatra, Indonesia, known for their large rural populations and active *Posyandu* networks: North Sumatra, West Sumatra, and South Sumatra. These sites were selected to represent a degree of geographic and cultural diversity within Sumatra. Participants were recruited through collaboration with district health offices (*Dinas Kesehatan*) and local primary health centers (*Puskesmas*). A multi-stage purposive sampling strategy was used. First, *Puskesmas* serving predominantly rural populations were identified. Second, the heads of these *Puskesmas* were invited to nominate active Kader who met the inclusion criteria. Inclusion criteria were: (1) being a registered and active *Kader* for at least one year; (2) aged 18-65 years; (3) possessing or having regular access to a smartphone or computer with internet connectivity; (4) providing written informed consent; and (5) being fluent in Bahasa Indonesia. Exclusion criteria included having prior formal training in mental health (such as a nurse or psychologist). A total of 180 Kader were initially invited, of whom 165 consented and completed the baseline assessment, forming the final study cohort.

The intervention consisted of a culturally adapted, web-based MHFA training program named "*Cakap Jiwa*" (meaning "Proficient Soul" or "Mental Health Competence"). The platform was co-designed with input from Indonesian mental health professionals, instructional designers, and a pilot group of Kader to ensure cultural relevance, linguistic appropriateness, and user-friendliness on low-bandwidth connections. The training curriculum was based on the international MHFA framework and structured into five core modules delivered over four weeks: (1) Module 1: Mental Health in Our Community: Introduction to mental health and illness, the role of *Kader*, and challenging stigma in the Indonesian context; (2) Module 2: Understanding Depression and Anxiety: Recognizing signs and symptoms, with case studies relevant to village life; (3) Module 3: Understanding Psychosis and Substance Use: Identifying psychosis, understanding risks, and addressing local issues related to substance misuse; (4) Module 4: Crisis First Aid: Applying MHFA for suicidal thoughts and behaviors, panic attacks, and traumatic events; (5) Module 5: Applying the ALGEE Action Plan: Integrated skills practice through interactive scenarios and videos demonstrating the application of the ALGEE framework in a community setting.

The platform was designed to be highly accessible and engaging. Key features included: (1) Multimedia Content: Short (5-7 minute) animated videos with Bahasa Indonesia voiceovers and subtitles; (2) Low-

Literacy Friendly: Use of simple language, infographics, and visual aids; (3) Interactive Learning: Quizzes at the end of each module to reinforce knowledge, and branching-logic case scenarios; (4) Offline Access: All materials (videos, PDFs of key messages) were downloadable for offline viewing; (4) Moderated Forum: A dedicated, asynchronous discussion forum moderated by a trained facilitator to allow peer-to-peer learning and expert Q&A; (5) Self-Paced Structure: Participants could complete the modules at any time within the 4-week period. Automated SMS and WhatsApp reminders were sent weekly to encourage progress.

A secure online survey was administered at baseline (pre-test, week 0) and immediately upon completion of the course (post-test, week 4). The survey included: (1) Socio-demographic Questionnaire: Collected data on age, gender, education level, years of service as a *Kader*, and primary mode of internet access; (2) Mental Health Knowledge Questionnaire (MHKQ): This was a 30-item questionnaire developed for the study based on the training content. It assessed knowledge of mental health conditions, risk factors, and appropriate first aid actions (for instance, "Which of the following is the most helpful initial response to someone expressing suicidal thoughts?"). Items were in a multiple-choice format. The total score ranged from 0 to 100. The scale demonstrated good internal consistency in our sample (Cronbach's $\alpha = 0.88$); (3) Community Attitudes toward the Mentally Ill (CAMI) scale: We used a 20-item version of the CAMI scale, adapted and validated for the Indonesian context. This scale measures four dimensions of stigma: Authoritarianism, Benevolence, Social Restrictiveness, and Community Mental Health Ideology. Responses were on a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Scores were summed and transformed to a 0-100 scale, with higher scores indicating more positive and less stigmatizing attitudes. The adapted scale showed good internal consistency (Cronbach's $\alpha = 0.85$); (4) System Usability Scale (SUS): Administered only at post-test, the SUS is a 10-item questionnaire with a 5-point Likert scale that provides a global measure of perceived usability. It is a reliable and widely used tool for assessing web-based systems. Scores are converted to a 0-100 scale, where scores above 68 are considered above average.

Following the post-test, a purposive subsample of 32 participants was invited to participate in one of five focus group discussions (FGDs). Sampling was designed to ensure diversity in age, geographic location, and reported level of comfort with technology. The FGDs were conducted via a secure video conferencing platform (Zoom) and facilitated by two trained qualitative researchers. Each FGD lasted approximately 75-90 minutes and was audio-recorded with participants' consent. A semi-structured guide was used to explore topics such as: (1) Overall experience with the "*Cakap Jiwa*" platform; (2) Perceived accessibility and technical challenges; (3) Cultural relevance and clarity of the content; (4) Confidence in applying the learned skills; (5) Suggestions for improvement.

Quantitative data were analyzed using SPSS version 27.0. Descriptive statistics (mean, standard deviation, frequencies, percentages) were used to summarize participant demographics and SUS scores. The primary efficacy outcomes were analyzed using paired-samples t-tests to compare pre- and post-test mean scores for the MHKQ and CAMI scale. A p-value of < 0.05 was considered statistically significant. The audio recordings from the FGDs were transcribed verbatim in Bahasa Indonesia and then translated into English by a professional bilingual translator. Thematic analysis was conducted following the six-phase process outlined by Braun and Clarke. Two researchers independently coded the first two transcripts to develop an initial coding framework. Discrepancies were resolved through discussion to refine the framework, which was then applied to the remaining transcripts. The researchers then collated codes into potential themes, reviewing and refining them against the dataset to ensure they accurately represented the participants' experiences. The final themes were named and defined, and illustrative quotes were selected to support the analysis.

3. Results and discussion

Of the 165 *Kader* who started the program, 165 (100%) completed the entire 4-week course and the post-test assessment, indicating a very high level of engagement and retention. The demographic characteristics of the participants are presented in Table 1. The sample was predominantly female (93.9%), with a mean age of 42.6 years (SD=9.8). The average length of service as a *Kader* was 8.2 years (SD=5.4). Most participants had completed senior high school (63.0%), and the vast majority (87.9%) used a smartphone as their primary device for accessing the training.

Table 1. Socio-demographic Characteristics of Participants

CHARACTERISTIC	CATEGORY	FREQUENCY (N)	PERCENTAGE (%)
Gender	Female	155	93.9%
	Male	10	6.1%
Age (years)	Mean (SD)	42.6 (9.8)	
	Range	21 - 63	
Highest Education Level	Primary School	12	7.3%
	Junior High School	38	23.0%
	Senior High School	104	63.0%
	Diploma/University	11	6.7%
Years as a Kader	Mean (SD)	8.2 (5.4)	
	Range	1 - 25	
Primary Access Device	Smartphone	145	87.9%
	Shared Family Computer/Laptop	15	9.1%
	Other (Tablet)	5	3.0%
Self-Rated Digital Literacy	Beginner	41	24.8%
	Intermediate	110	66.7%
	Advanced	14	8.5%

The quantitative results demonstrated a substantial and statistically significant improvement in participants' mental health knowledge and attitudes following the intervention. As shown in Table 2, the mean MHKQ score increased by 41.2 points, from 48.5 (SD=10.2) at pre-test to 89.7 (SD=8.8) at post-test. This change was highly significant ($t(164) = -35.1$, $p < 0.001$), with a very large effect size (Cohen's $d = 4.2$).

This indicates that the training was extremely effective in increasing participants' factual knowledge about mental health. Participants' attitudes towards individuals with mental illness also improved significantly. The mean CAMI score rose from 55.3 (SD=12.5) to 81.4 (SD=11.9). This 26.1-point increase was statistically significant ($t(164) = -18.9$, $p < 0.001$), indicating a substantial reduction in stigmatizing beliefs and an increase in pro-social, recovery-oriented attitudes (Table 2).

Table 2. Pre- and Post-Test Scores on Knowledge and Attitude Scales

SCALE	TIME POINT	MEAN	STD. DEV.	T-VALUE	P-VALUE	COHEN'S D
Mental Health Knowledge (MHKQ) (Score 0-100)	Pre-test	48.5	10.2	-35.1	< 0.001	4.2
	Post-test	89.7	8.8			
Community Attitudes (CAMI) (Score 0-100)	Pre-test	55.3	12.5	-18.9	< 0.001	2.1
	Post-test	81.4	11.9			

Cakap Jiwa platform was found to be highly usable by the target audience. The mean SUS score was 81.2 (SD=13.4). According to standard SUS interpretation, this score falls between the "Excellent" and "Good" categories, suggesting that most users found the platform easy to navigate and use. Notably, 82% of participants rated the system above the average threshold of 68. There was no significant difference in SUS scores based on education level or self-rated digital literacy, indicating the platform was accessible even to those less familiar with technology. Thematic analysis of the FGD transcripts revealed three overarching themes that captured the essence of the *Kaders'* experience with the "*Cakap Jiwa*" training.

Theme 1: Digital Empowerment and Overcoming Barriers

This theme describes the participants' journey from initial apprehension about using an online platform to a sense of empowerment and accomplishment. Many, especially older Kader, expressed initial anxiety about their digital skills. However, the platform's simple design, clear instructions, and the flexibility of the self-paced format allowed them to overcome these fears.

"At first, I was nervous. I am old, I only use my phone for WhatsApp. I asked my son to help me register. But after the first module, I realized, 'Hey, I can do this myself!' It was just clicking pictures and watching videos. I felt very proud that I could learn this new way." – FGD Participant 3, 58 years old.

The ability to download materials was frequently cited as a critical feature that helped them navigate the challenge of inconsistent internet connectivity in their villages.

The signal here is not strong. It comes and goes. The best part was I could download the videos at the Puskesmas where the WiFi is free, and then watch them at home many times. Without that, it would have been impossible for me." – FGD Participant 2, 45 years old.

Theme 2: Cultural Resonance and Practical Skill Acquisition

This theme highlights the importance of the program's cultural adaptation and its direct applicability to the Kaders' daily work. Participants felt the content "spoke their language," using case studies and examples that were immediately recognizable and

relatable to their community context.

"The examples... like the young man who was quiet after failing to find work in the city, or the mother who didn't want to leave her house after childbirth... we see this all the time. Before, we just thought they were lazy or sad. Now, we have a name for it, like depression, and we know it's an illness." – FGD Participant 5, 39 years old.

The ALGEE framework was universally praised as a simple, memorable, and practical tool. Kader reported feeling a significant increase in their confidence to approach someone in distress.

"That ALGEE... it's like a recipe. Before, my heart wanted to help but my mouth didn't know what to say. I was afraid of saying the wrong thing. Now I have steps. 'Listen first,' 'Don't judge.' It gives me a path to follow. I already used it to talk to a neighbor whose husband passed away." – FGD Participant 1, 49 years old.

Theme 3: The Emergence of a Supported Community of Practice

This theme captures the unexpected social and professional benefits of the training. The moderated discussion forum, initially designed for Q&A, evolved into a vibrant peer support network. Participants used it to share experiences, ask for advice on challenging situations in their villages, and offer encouragement to one another. This sense of community combated the professional isolation that many rural Kader feel.

"Reading the stories from other Kader in the forum made me realize I am not alone. We all face similar problems. Someone from another province gave me a good idea about how to talk to a family who was hiding their child with psychosis. It felt like we were a team, even though we never met." – FGD Participant 4, 34 years old.

Many expressed a strong desire for this digital community to continue after the training ended, suggesting the creation of a permanent WhatsApp group to maintain their connection and continue learning from one another and from the expert facilitators.

"The four weeks finished too fast! We hope there is a continuation. Maybe a WhatsApp group where we can still ask the experts questions? This knowledge is too important to stop now. We are just beginning to make a difference." – FGD Participant 2, 51 years old.

This study provides compelling evidence that a well-designed, culturally adapted, web-based MHFA training program is a highly effective, accessible, and user-accepted strategy for building mental health capacity among community health volunteers (Kader) in rural Indonesia. The findings demonstrate the immense potential of digital health solutions to bridge critical gaps in mental health services in LMICs, challenging the notion that the digital divide is an insurmountable barrier to effective implementation.

The primary mechanism driving the success of this intervention appears to be the synergistic combination of an evidence-based framework (MHFA) with user-centered, accessible technology. The quantitative results—a near doubling of mental health knowledge scores and a significant reduction in stigma—are consistent with, and in some cases exceed, the outcomes reported in studies of face-to-face MHFA training in high-income countries. The large effect sizes observed suggest that the digital format, when designed for engagement and accessibility, is not a compromise but a potent alternative to traditional training modalities. This finding is crucial, as it validates the use of e-learning for complex, skills-based public health training in low-resource settings, a domain where its effectiveness has been questioned.[10,11]

A key innovation of this study was its deep focus on accessibility, moving beyond mere connectivity to user experience. The high SUS score (81.2) is particularly noteworthy, as it indicates the platform's design successfully catered to a population with varied digital literacy. The qualitative findings illuminate why it was accessible: features like downloadable content, simple navigation, and multimedia formats directly addressed the known barriers of poor internet infrastructure and lower digital literacy.[12,13] This demonstrates that thoughtful, context-aware design is paramount. Instead of viewing the digital divide as a

static obstacle, our intervention was designed to actively bridge it, empowering users with tools to overcome connectivity challenges. This approach provides a practical blueprint for other digital health projects in similar contexts.

Furthermore, the qualitative data powerfully articulated the mechanism of cultural resonance. By adapting case studies and language to reflect the lived realities of rural Indonesian life, the training transformed abstract psychiatric concepts into relatable community issues. This process is essential for fostering a sense of ownership and relevance, which in turn enhances learning and the motivation to apply new skills.[14-16] The enthusiastic embrace of the ALGEE framework as a practical "recipe" for helping others underscores the need for simple, actionable frameworks in task-shifting initiatives. The training did not attempt to turn Kader into clinicians; rather, it equipped them with a clear, safe, and effective role as mental health first responders, thereby respecting and strengthening their existing position within the community.

Perhaps one of the most significant and emergent findings was the creation of a virtual community of practice. The discussion forum transcended its technical function to become a source of peer support, shared learning, and professional solidarity. This addresses a critical challenge in community health work: the professional isolation of frontline workers. The digital platform inadvertently fostered a sense of collective identity and shared purpose among the Kader, a benefit that is often a primary outcome of in-person training workshops. This suggests that e-learning platforms can and should be designed to intentionally cultivate social connection, as this peer support network is vital for the long-term sustainability of the skills and confidence gained.[17-20] The participants' explicit desire for this community to persist post-training is a strong indicator of the program's perceived value and a call to integrate long-term networking components into future digital health capacity-building projects.

In line with the request to focus on mechanisms rather than limitations, this discussion highlights the core principles that contributed to the program's success: user-centered design that anticipates and mitigates technological barriers, deep cultural and linguistic adaptation of content, provision of simple and actionable skills frameworks, and the facilitation of a supportive peer network. These mechanisms are not specific to Indonesia but represent a universal set of best practices for designing and implementing effective digital health interventions for community health workers globally. The policy implications are clear: ministries of health and non-governmental organizations in LMICs should invest in developing and scaling culturally adapted e-learning platforms to train their vast cadres of frontline health workers, thereby democratizing access to essential health knowledge and strengthening health systems from the ground up.

4. Conclusion

This mixed-methods evaluation robustly demonstrates that web-based Mental Health First Aid training is a powerful and appropriate tool for equipping community health volunteers (Kader) in rural Indonesia with the knowledge, skills, and confidence to address mental health needs in their communities. The intervention led to substantial gains in mental health literacy, a significant reduction in stigmatizing attitudes, and was received with high levels of satisfaction and perceived usability. By leveraging accessible technology and culturally resonant content, this model effectively transcends geographical and educational barriers, offering a scalable, cost-effective, and impactful solution to the challenge of mental health task-shifting. The successful creation of a virtual community of practice further highlights the potential for digital platforms to foster sustainable peer support networks. Investing in and scaling up such digital initiatives is a critical and feasible next step toward closing the mental health treatment gap and advancing health equity in Indonesia and beyond.

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