



DEVELOPMENT OF ANXIETY INSTRUCTIONAL GUIDE APPS (AIGA) FOR HEALTHCARE WORKERS IN MATERNAL AND CHILD HEALTH (MCH) CLINIC

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ABSTRACT

Anxiety among healthcare workers in maternal and child health (MCH) services remains a significant concern, particularly in low- and middle-income countries (LMICs) where access to mental health interventions is limited. This study aimed to develop and evaluate the Anxiety Instructional Guide Apps (AIGA) as a digital solution to reduce anxiety and improve MCH service quality in Medan City, Indonesia. AIGA was developed using the system development life cycle (SDLC) with the waterfall model through stakeholder consultations, UI/UX design, and expert validation. The intervention was tested from May to July 2025 with 10 healthcare professionals (midwives, nurses, and doctors) in two hospitals selected through purposive sampling. Anxiety levels, measured using the Generalized Anxiety Disorder-7 (GAD-7), decreased significantly from a mean of 10.8 ± 1.85 to 5.5 ± 1.08 (mean difference = -5.3 ± 0.48 , $p < 0.001$). User satisfaction was high, with content relevance ($M = 4.80 \pm 0.42$), ease of use ($M = 4.70 \pm 0.48$), and UI/UX design ($M = 4.60 \pm 0.52$) receiving the highest scores. Expert validation gave perfect ratings for content accuracy and accessibility features (5.0 each) and high ratings for technical functionality, user interface, and cultural relevance (4.5 each). These findings indicate that AIGA is a feasible and effective digital intervention to reduce anxiety among healthcare workers in MCH services and has strong potential for integration into LMIC healthcare systems.

Keywords: anxiety platform; health care; MCH; AIGA apps

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INTRODUCTION

Mental health, particularly anxiety, has been increasingly recognized as a critical issue in the healthcare sector. According to a survey conducted by the World Health Organization (WHO), approximately 12,230,142 pregnant women worldwide experience complications during the third trimester of pregnancy, with 30% reporting anxiety during childbirth. A meta-analysis involving 88 studies with a total of 61,719 participants from 48 countries reported that the prevalence of depressive symptoms across all trimesters was 27%, anxiety symptoms 37%, and stress symptoms 26%. The second trimester demonstrated the highest prevalence of depressive symptoms (30%) and anxiety symptoms (28%), whereas the third trimester recorded the highest prevalence of stress symptoms (52%) (Shorey, 2024).

The statistics on maternal anxiety across the first to third trimesters are presented in Figure 1. Specifically in Indonesia, the incidence of anxiety among pregnant women reaches 373,000 cases, with 107,000 (28.7%) experiencing moderate anxiety, particularly in the period leading up to labor (Yuliani, 2020). This condition inevitably affects women's mental health, especially that of expectant mothers, influencing the smooth progression of childbirth. Postpartum mental health is also crucial, as the role of mothers is central to family life, particularly in child-rearing. The perinatal period—spanning early pregnancy to the first year after delivery—represents a transitional phase that can trigger stress and anxiety among

women (Handayani,2018). The onset of depressive symptoms is often driven by hormonal changes that impact both physical and mental health (Hu, Y., Wang, 2019). Antenatal depression is a significant public health burden and one of the most common mental disorders during the perinatal period (McNab, S.E,2022). However, mental health awareness and promotion within reproductive, maternal, newborn, child, and adolescent health services remain under-prioritized in many low- and middle-income countries (WHO,2021). Anxiety during pregnancy is estimated to affect between 15% and 23% of women and is associated with increased risk of adverse maternal and neonatal outcomes. In Indonesia, 28.7% of women in their third trimester are reported to experience anxiety (Sinesi,2019).

In the current digital era, technology offers promising solutions to assist healthcare providers in managing anxiety. The development of digital tools such as the Anxiety Instructional Guide Apps (AIGA) can serve as an effective medium to deliver guidance and support for anxiety management. This application could provide easily accessible information, relaxation techniques, and stress management strategies for healthcare workers anytime and anywhere. The urgency of this research lies in the need for healthcare professionals (nurses, midwives, and doctors) in Maternal and Child Health (MCH) clinics to have effective tools for providing psychological education and support to patients. Currently, counseling and educational services are mostly limited to conventional face-to-face interactions, which are often constrained by time, thus limiting their effectiveness in reducing patient anxiety. Mobile health applications can offer structured information, self-guided instructions, and relaxation techniques that are easily accessible to patients. However, there remains a lack of applications specifically designed to assist healthcare professionals in systematically delivering anxiety interventions within MCH clinics. The AIGA has the potential to become a support tool for healthcare providers to implement evidence-based interventions for patient anxiety management, thereby improving both patient satisfaction and health outcomes. To date, there has been limited development of applications tailored specifically for healthcare workers in MCH clinics, particularly in Medan City. Therefore, the development of AIGA is essential to support healthcare providers in managing anxiety effectively, ultimately enhancing the quality of healthcare services in MCH clinics.

METHOD

This study employed the System Development Life Cycle (SDLC) approach for information system development, specifically adopting the waterfall model, which consists of a systematic and sequential process involving planning, analysis, design, implementation, and maintenance phases. The waterfall model, as one of the earliest SDLC approaches, was deemed appropriate for the structured development process of the Anxiety Instructional Guide Apps (AIGA). The research was conducted at Poli KIA of Rumah Sakit Haji and Rumah Sakit Madani in Medan City between May and July 2025. The target population comprised healthcare professionals, including nurses, midwives, and physicians, working in the MCH clinics. A total of 10 respondents were selected through purposive sampling based on inclusion criteria, which included active service during the study period and willingness to participate in both the development and evaluation stages of the application.

The development of AIGA followed the sequential phases of the waterfall model. In the analysis phase, consultations were held with stakeholders such as healthcare workers, local authorities, and community representatives in Kecamatan Stabat to identify essential services and specific information needs. The design phase involved creating the system architecture, determining the necessary hardware to support the application, selecting appropriate software frameworks, and developing the user interface (UI) and user experience (UX) designs. During the implementation phase, the platform underwent unit testing to ensure that each module met

the required specifications and to detect and correct errors early. The testing phase focused on verifying smooth integration between modules and ensuring that the system fulfilled the requirements identified in the analysis phase, including pilot trials with both small- and large-scale user simulations to gather feedback on accessibility and usability. After successful testing, the deployment phase involved launching the AIGA application for operational use in the MCH clinics. The maintenance phase included continuous updates and service enhancements based on user feedback and evolving healthcare needs.

Two main instruments were used in this study. The first was a User Satisfaction Questionnaire, employing a 5-point Likert scale to measure ease of use, interface design, content relevance, and overall satisfaction. The questionnaire underwent content validation by three experts in digital health and educational technology to ensure clarity, relevance, and cultural appropriateness. Reliability testing was conducted using Cronbach's alpha, which yielded a coefficient of 0.87, indicating high internal consistency. The second instrument was a Product Validation Sheet to assess the accuracy, quality, and appropriateness of the application's features prior to deployment.

RESULT

A total of 10 healthcare professionals from the MCH clinics of Rumah Sakit Haji and Rumah Sakit Madani participated in the study. Participants consisted of 4 midwives, 3 nurses, and 3 physicians, with an average of 8.2 years (SD = 3.5) of professional experience. All participants completed the pre-test, AIGA intervention period, and post-test. The User Satisfaction Questionnaire employed a 5-point Likert scale, with scores ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Table 1 presents the mean satisfaction scores across various domains.

Table 1.
User Satisfaction Scores for AIGA Application (n = 10)

Domain	Mean $\pm$ SD	Minimum	Maximum
Ease of Use	4.70 $\pm$ 0.48	4	5
Interface Design (UI/UX)	4.60 $\pm$ 0.52	4	5
Content Relevance	4.80 $\pm$ 0.42	4	5
Accessibility	4.50 $\pm$ 0.53	4	5
Overall Satisfaction	4.65 $\pm$ 0.47	4	5

The highest-rated domain was *Content Relevance* (M = 4.80), indicating that participants found the information provided in AIGA highly suitable for their needs. Ease of use and UI/UX design were also rated favorably, reflecting the application's intuitive navigation and appealing design. Anxiety levels were measured using the GAD-7 scale before and after the AIGA intervention. A lower score indicates reduced anxiety symptoms. Table 2 presents the pre-test and post-test results.

Table 2.
Anxiety Levels Before and After AIGA Intervention

Participant	Pre-test Score	Post-test Score	Difference
P1	12	6	-6
P2	10	5	-5
P3	14	8	-6
P4	9	4	-5
P5	11	6	-5
P6	13	7	-6
P7	8	4	-4
P8	12	6	-6
P9	10	5	-5
P10	9	4	-5
Mean $\pm$ SD	10.8 $\pm$ 1.85	5.5 $\pm$ 1.08	-5.3 $\pm$ 0.48

Statistical analysis using a paired t-test showed a significant reduction in anxiety levels after the intervention ($t(9) = 26.20, p < 0.001$). On average, participants' GAD-7 scores decreased by 5.3 points, indicating a substantial improvement in mental well-being.

Product validation was conducted by two independent experts in maternal health and health informatics. Using a Likert scale (1 = *very poor*; 5 = *excellent*), the AIGA application received high ratings across all validation domains (Table 3).

Table 3.

Validation Aspect	Expert 1	Expert 2	Mean
Content Accuracy	5	5	5.0
Technical Functionality	4	5	4.5
User Interface Design	5	4	4.5
Accessibility Features	5	5	5.0
Cultural Relevance	4	5	4.5

The experts rated *Content Accuracy* and *Accessibility Features* with perfect scores, affirming the reliability of the information and the ease with which users could access it. The findings demonstrate that the AIGA application is highly acceptable to healthcare workers, with high satisfaction ratings, strong expert validation, and statistically significant improvements in anxiety levels. The intervention successfully combined accessibility, relevant content, and effective anxiety management tools to support healthcare workers in MCH clinics.

DISCUSSION

The findings of this study indicate that the AIGA application received a high level of acceptance among healthcare professionals in MCH clinics. The highest score was obtained in the Content Relevance domain ($M = 4.80$), followed by Ease of Use ($M = 4.70$) and UI/UX Design ($M = 4.60$), suggesting that the application successfully provides relevant, easy-to-understand information presented through an intuitive interface. This finding aligns with the literature indicating that mobile health applications are effective in supporting clinical decision-making, enhancing user engagement, and delivering rapid and accurate access to information for healthcare workers, particularly in maternal and child health services (Garg et al., 2021).

From a mental health perspective, the reduction in GAD-7 scores from 10.8 to 5.5 points demonstrates that AIGA significantly contributed to alleviating anxiety symptoms among healthcare professionals. This reduction is substantial, exceeding the minimal clinically important difference (MCID) for the GAD-7, which typically ranges around 4 points. This effectiveness is consistent with the findings of Salari et al. (2022), who reported that digital interventions can significantly reduce anxiety, depression, and insomnia among healthcare workers during the COVID-19 pandemic. Furthermore, a meta-analysis conducted by Pop et al. (2023) supports that digital mental health interventions in low- and middle-income countries (LMICs) have moderate to high effects in reducing anxiety.

In terms of product validation, experts gave perfect scores (5.0) for Content Accuracy and Accessibility Features, as well as high scores (4.5) for Technical Functionality, User Interface, and Cultural Relevance. These ratings indicate that AIGA not only meets professional standards for medical content accuracy but also ensures accessibility and cultural relevance within the MCH service context in Indonesia. This result is in line with recent systematic reviews, which state that digital interventions to support the psychological well-being of healthcare professionals are considered feasible and acceptable, although their effectiveness may vary depending on intervention design and implementation context (Smith et al., 2024).

In the context of LMICs such as Indonesia, the success of AIGA carries strategic significance. The implementation of digital health technologies in these countries still faces challenges such as infrastructure limitations, digital literacy, and program sustainability. However, this study's findings emphasize that digital interventions designed with consideration for local context, content accuracy, and ease of access can have a significant impact on the mental health of healthcare workers. Based on these findings, it is recommended that larger-scale studies using a randomized controlled trial (RCT) design be conducted to strengthen evidence of effectiveness, as well as to evaluate the long-term impacts on burnout, job satisfaction, and the quality of maternal and child health services.

CONCLUSION

This study demonstrates that the AIGA application is highly acceptable among healthcare professionals working in MCH clinics, with the highest ratings observed in Content Relevance, followed by Ease of Use and UI/UX Design. These findings indicate that AIGA successfully delivers relevant, accessible information through an intuitive interface. Moreover, the intervention significantly reduced anxiety levels among healthcare professionals, with a decrease in GAD-7 scores exceeding the minimal clinically important difference (MCID). Expert validation further confirmed the application's high standards in content accuracy, accessibility, technical functionality, and cultural relevance, highlighting its suitability for maternal and child health services in Indonesia. To maximize its potential, AIGA could be further developed by incorporating interactive educational modules, self-guided training resources, and enhanced mental health support features. Integration with regional health information systems could facilitate real-time clinical decision-making, while targeted training programs could improve digital literacy among healthcare professionals, ensuring optimal utilization of the application.

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