



# Design of Health Application Prototype "Medimate" Using Design Thinking And System Usability Scale (SUS)

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**Abstract:** Digital health applications in Indonesia face significant usability challenges, with popular platforms like Halodoc and Alodokter showing inconsistent System Usability Scale (SUS) scores ranging from 63.3 to 82.21. This disparity indicates a critical gap in user experience quality, where poor interface design leads to user frustration, abandonment, and reduced trust in digital health services. To address this problem, this research aims to design a user-centered health application prototype, "Medimate," that resolves critical interface and navigation deficiencies through the Design Thinking framework. The study employs a mixed-methods approach, utilizing five-stage Design Thinking (Empathize, Define, Ideate, Prototype, Test) for development and SUS for quantitative evaluation with 36 respondents. Results indicate that "Medimate" effectively addresses UX issues, achieving a mean SUS score of 80.42, classified as Grade A- (Excellent). Key design improvements include transparent pricing structures, intuitive navigation flows, and integrated mental health features. The study concludes that Design Thinking significantly enhances usability metrics in health applications. "Medimate" demonstrates high acceptability and viability for further functional development. Practical implications include providing developers with a validated design blueprint and recommending minimum usability standards (SUS > 70) for health app certification. Future research should expand sample sizes and evaluate backend performance.

**Keywords:** Design Thinking; SUS; Health Application; UIUX; Prototype Design

## 1. INTRODUCTION

The rapid digitization of healthcare in Indonesia has fundamentally transformed how citizens access medical services, driven by the Ministry of Health's Digital Health Transformation Strategy 2021–2024 [1]. Mobile health (mHealth) applications such as Halodoc, Alodokter, and Mobile JKN have become ubiquitous, offering telemedicine, drug delivery, and health monitoring [2]. Despite this growth, significant disparities in User Experience (UX) quality remain. Recent evaluations indicate inconsistent System Usability Scale (SUS) scores across leading platforms, ranging from 63.3 for Mobile JKN to 82.21 for Halodoc [3], [4]. These inconsistencies suggest that while functionality exists, usability often remains secondary, leading to user frustration, abandonment, and reduced trust in digital health services [5].

The core problem lies in the design process. Many existing applications prioritize feature completeness over user-centered interface design, resulting in navigation ambiguities and information hierarchy issues [6]. While previous studies have evaluated existing applications using SUS [7], [8], however, few studies document the end-to-end Design Thinking process required to achieve high usability standards from the ground up for new health prototypes in the Indonesian context. Specifically,







- a) Qualitative Phase: Two respondents were selected for in-depth interviews to construct detailed User Personas (Alex and Sandra). This aligns with Nielsen's recommendation that 5 users can reveal approximately 85% of usability problems in qualitative research [15].
- b) Quantitative Phase: A total of 36 respondents participated in the usability testing phase. This sample size was determined based on established guidelines for System Usability Scale (SUS) evaluation:
  1. Statistical Validity: Sauro and Lewis [16] recommend a minimum of 30 respondents for SUS studies to achieve statistical significance and reliable confidence intervals. With n=36, this study exceeds that threshold.
  2. Confidence Level: According to Tullis and Stetson[17], a sample size of 35-40 respondents provides a margin of error of approximately ±10 points at 95% confidence level for SUS scores, which is acceptable for prototype evaluation.
  3. Comparative Studies: Recent Indonesian UX studies using SUS have employed similar sample sizes: Kusuma et al. [7] used 50 respondents for mobile banking, Siwu et al. [12] used 45 for digital library applications, and Wardani et al. [9] used 50 for home care applications. The n=36 in this study is within the acceptable range for prototype-level evaluation.
  4. Resource Efficiency: Brooke [10] notes that SUS was designed as a "quick and dirty" tool that provides reliable results without requiring large sample sizes typical of traditional psychometric instruments.

All participants were based in Manado, Indonesia, ensuring cultural and contextual relevance to the target market. The sample consisted of 18 males (50%) and 18 females (50%), providing balanced gender representation for usability assessment.

### Instruments and Tools

Data collection and development utilized industry-standard digital tools. The prototype was developed using Figma, a collaborative interface design tool that allows for high-fidelity interactive simulation without backend coding. Usability evaluation was conducted using the System Usability Scale (SUS), a 10-item questionnaire utilizing a 5-point Likert scale. The SUS was chosen for its reliability and industry-wide acceptance as a "quick and dirty" metric for perceived usability [18]. Responses were collected via Google Forms to facilitate remote data gathering and anonymity.

**Table 1. Sample Size Comparison in Related SUS Studies**

Study	Domain	Sample Size (n)	SUS Score	Grade
Kusuma et al. [7]	Mobile Banking	50	85.2	A
Wardani et al. [9]	Home Care App	50	93.25	A+
Siwu et al. [12]	Digital Library	45	75.0	B
<b>Medimate (This Study)</b>	<b>Health Application</b>	<b>36</b>	<b>80.42</b>	<b>A-</b>
Minimum Recommended [17]	General	30	-	-

### Procedure

The research procedure followed the Design Thinking cycle over a period of 10 months

- a) Empathize: Semi-structured interviews were conducted to gather insights on user frustrations with existing apps like Halodoc and Alodokter.
- b) Define: Insights were synthesized into problem statements and "How Might We" questions.
- c) Ideate: Wireframes (Low-Fidelity) were created to visualize potential solutions.
- d) Prototype: High-Fidelity interactive prototypes were developed in Figma, incorporating a consistent
- e) Design System (colors, typography, components).
- f) Test: Participants interacted with the prototype and completed the SUS questionnaire.

### Data Analysis

Quantitative data from the SUS questionnaire were analyzed using the standard scoring formula established by Brooke [10]. For odd-numbered questions, 1 was subtracted from the user response; for





even-numbered questions, the response was subtracted from 5. The sum was multiplied by 2.5 to convert the score to a 0–100 scale.

$$\bar{X} = \frac{\sum X}{n} \quad (1)$$

Where  $\bar{X}$  is the mean SUS score,  $\sum X$  is the total score and  $n$  is the number of respondents. Scores were then classified using the adjective rating scale and grade classification system (e.g., Grade A- for scores 78.9–80.7) to determine acceptability.

**Table 2.** SUS Grade Classification Reference

Grade	SUS Score Range	Acceptability
<b>A+</b>	84.1 – 100	Acceptable
<b>A</b>	80.8 – 84.0	Acceptable
<b>A-</b>	78.9 – 80.7	Acceptable
<b>B+</b>	77.2 – 78.8	Acceptable
<b>B</b>	74.1 – 77.1	Acceptable
<b>B-</b>	72.6 – 74.0	Acceptable
<b>C+</b>	71.1 – 72.5	Acceptable
<b>C</b>	65.0 – 71.0	Marginal
<b>D</b>	51.7 – 62.6	Marginal
<b>F</b>	0 – 51.6	Not Acceptable

Qualitative data from interviews were analyzed thematically to identify recurring pain points and design requirements.

### 3. RESULT AND DISCUSSIONS

This section presents the outcomes of the Design Thinking process and the quantitative usability evaluation of the "Medimate" health application prototype. The results are divided into five Design Thinking stages (Empathize, Define, Ideate, Prototype, Test), usability metrics, and a discussion interpreting these findings within the context of existing literature. The Design Thinking framework was implemented across five iterative stages, each producing specific artifacts and insights that informed subsequent design decisions.

#### 3.1 Empathize Stage

The Empathize stage focused on understanding user needs through qualitative research. Two user personas were developed based on in-depth interviews with representative users aged 21 years from Manado, Indonesia.

**Table 3.** Comparative Summary of User Persona Pain Points and Design Solutions

User Persona	Pain Point	Design Solution Implemented
<b>Alex</b>	Misleading price designs	Transparent pricing displayed before checkout confirmation
	Ambiguous product information	Visual labels and icons for medication types (prescription, over-the-counter, supplements)
	Poor content layout	Clean article layouts with consistent typography and adequate spacing
	Confusing user flows	Logical navigation hierarchy with clear step indicators
	No health monitoring	Integrated daily health dashboard (steps, sleep, heart rate)



<b>Sandra</b>	Unconvincing doctor information	Poor button placement	Comprehensive profiles with ratings, experience, response time, and availability status
	Uncomfortable design	Lack of onboarding guidance	Prominent "Chat Doctor" button on homepage with fixed bottom navigation bar
	visual	Consistent color palette, readable typography scale, and adequate contrast	Consistent color palette, readable typography scale, and adequate contrast
	No personal health tracking	Integrated menstrual calendar with seamless app integration	Welcome tutorial and feature highlights for first-time users

Key insights from this stage revealed that cost transparency and navigation efficiency were the most critical pain points across both personas, directly informing the Define stage problem statements.

### 3.2 Define Stage

The Define stage synthesized empathize findings into clear problem statements using "How Might We" (HMW) questions. Six core HMW statements were developed, each mapped to specific design solutions.

**Table 4.** How Might We (HMW) Statements and Solutions

HMW Question	Proposed Solution
<b>How to simplify access to main features?</b>	Quick access buttons on homepage (Chat Doctor, fixed navbar)
<b>How to help users find available doctors today?</b>	Real-time availability filter with specialist sorting
<b>How to present article content more comfortably?</b>	Clean layout with consistent typography and spacing
<b>How to present mental health content appropriately?</b>	Emotionally-sensitive content design with concise explanations
<b>How to help users understand main features quickly?</b>	Onboarding tutorial and feature highlights
<b>How to make doctor profiles more attractive?</b>	Comprehensive profiles with ratings, experience, and response time

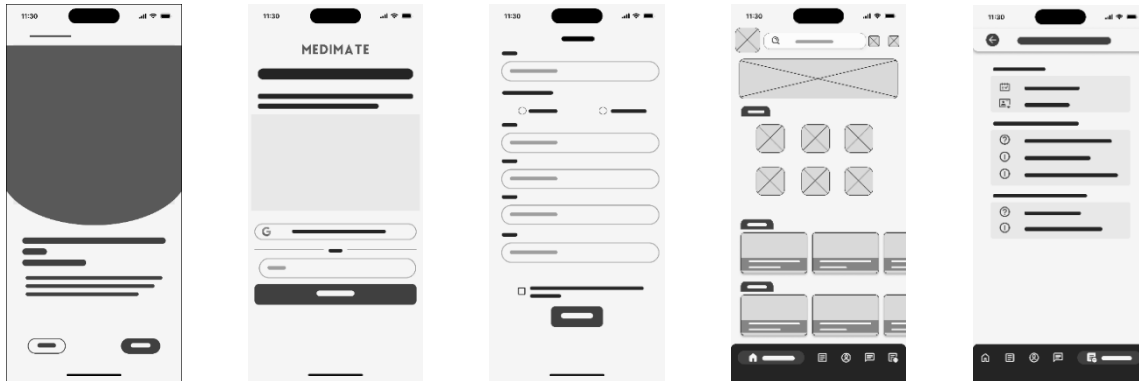
This stage ensured that all subsequent design decisions were directly traceable to verified user needs rather than assumptions [6].

### 3.3 Ideate Stage

The Ideate stage produced multiple low-fidelity wireframe iterations. Two major iteration cycles were completed before advancing to high-fidelity prototyping.



**Figure 2.** Initial wireframes for Welcome Page, Login/Sign Up, Homepage, Transaction History, Profile, Message, and Other Menu.



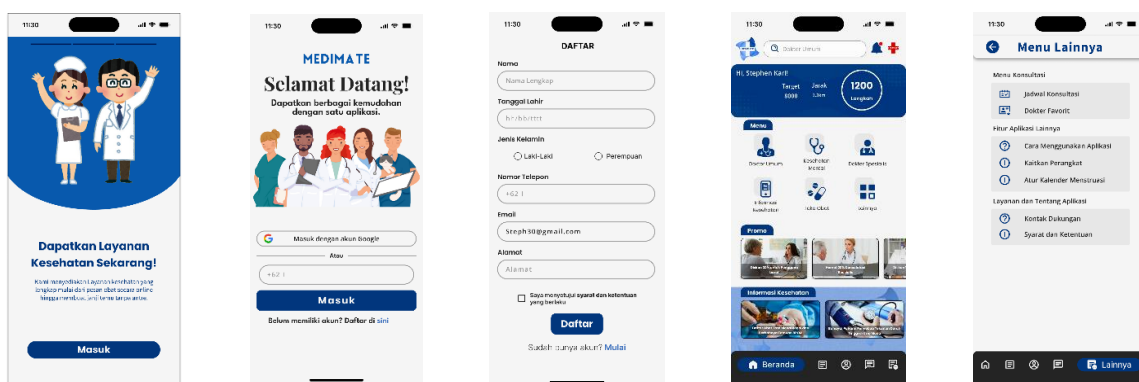
**Figure 3.** Redesigned wireframes based on user persona feedback

Key changes included; a) Simplified Welcome Page with clearer value proposition, b) Streamlined Login/Sign Up flow with Google integration, c) Reorganized Homepage with prominent feature access, d) Improved navigation hierarchy in Other Menu.

The iterative approach allowed for rapid validation of information architecture before committing to visual design, reducing costly redesigns in later stages.

### 3.4 Prototype Stage Design Result

The Design Thinking process yielded a High-Fidelity (Hi-Fi) interactive prototype developed using Figma. The design was grounded in insights from the Empathize stage, where two user personas (Alex and Sandra) identified critical pain points regarding cost transparency, navigation logic, and information hierarchy. To address these, a comprehensive Design System was established, ensuring visual consistency across all interfaces. A High-Fidelity (Hi-Fi) interactive prototype was developed in Figma. Key interface screens including the Homepage, Doctor Search, and Emergency Services are shown in Figure 4.



**Figure 4.** Hi-Fi agreed wireframes for Welcome Page, Login/Sign Up, Homepage, Transaction History, Profile, Message, and Other Menu.

The visual identity is anchored by the "Medimate" logo, which symbolizes medical trust and personal companionship (Figure 1). The color palette utilizes a primary blue gradient (#0858ad to #a374ff) to evoke professionalism and calmness, aligned with health industry standards. Typography tokens were defined across six levels (Title Hero to Body) to maintain clear information hierarchy, addressing user frustrations regarding readability found in existing applications.



Figure 5. Medimate Logo

Key features implemented in the Hi-Fi prototype include a streamlined Bottom Navigation Bar for intuitive access, a transparent transaction history module, and integrated mental health services (Psychologist/Psychiatrist search). Figure 5 illustrates the main interface components, including the Homepage, Doctor Search, and Emergency Services. Iterative testing with user personas led to significant redesigns of the Welcome Page and Login flow to reduce cognitive load before the final usability test.

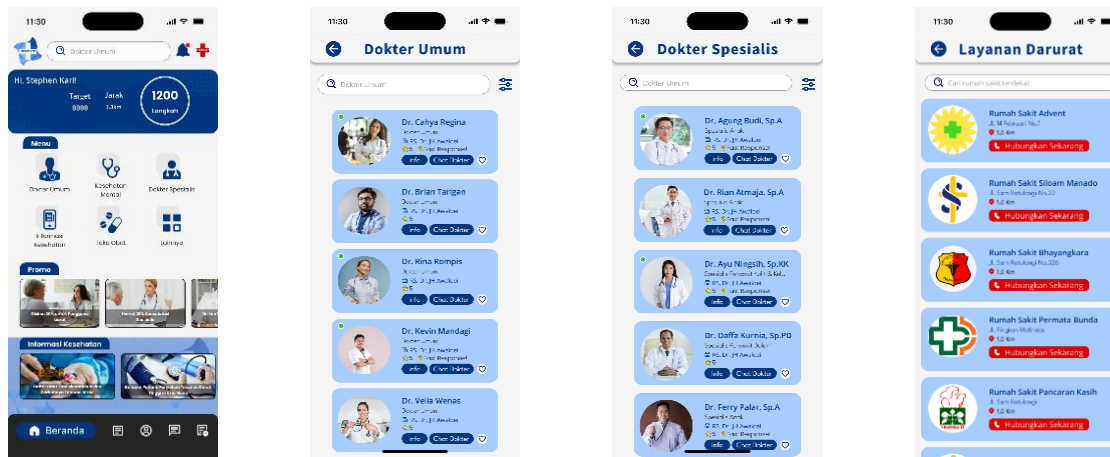


Figure 6. Homepage, Doctor Search, and Emergency Services

### 3.5 Usability Evaluation Result

The prototype was evaluated by 36 respondents using the System Usability Scale (SUS). Participants ranged from 12 to 27 years old, all possessing prior experience with digital health applications. The raw data were converted using the standard Brooke formula, where odd-numbered item scores were reduced by 1, and even-numbered item scores were subtracted from 5. The sum was multiplied by 2.5 to obtain a score between 0 and 100.

Table 1 presents the summarized SUS scores for all respondents. The individual scores ranged from a low of 15 (Respondent 27) to a perfect 100 (Respondent 30).

Table 5. Usability Evaluation

Respondent ID	Raw Score	SUS Score	Grade	Acceptability
Res 1	31	77.5	B	Acceptable
Res 2	22	55.0	D	Marginal
Res 3	36	90.0	A+	Acceptable
Res 4	31	77.5	B	Acceptable
Res 5	36	90.0	A+	Acceptable
Res 6	35	87.5	A	Acceptable
Res 7	32	80.0	A-	Acceptable
Res 8	35	87.5	A	Acceptable



Respondent ID	Raw Score	SUS Score	Grade	Acceptability
Res 9	35	87.5	A	Acceptable
Res 10	20	50.0	D	Marginal
Res 11	36	90.0	A+	Acceptable
Res 12	35	87.5	A	Acceptable
Res 13	36	90.0	A+	Acceptable
Res 14	29	72.5	B-	Acceptable
Res 15	36	90.0	A+	Acceptable
Res 16	36	90.0	A+	Acceptable
Res 17	34	85.0	A	Acceptable
Res 18	21	52.5	D	Marginal
Res 19	34	85.0	A	Acceptable
Res 20	32	80.0	A-	Acceptable
Res 21	23	57.5	D	Marginal
Res 22	35	87.5	A	Acceptable
Res 23	35	87.5	A	Acceptable
Res 24	38	95.0	A+	Acceptable
Res 25	34	85.0	A	Acceptable
Res 26	36	90.0	A+	Acceptable
Res 27	6	15.0	F	Not Acceptable
Res 28	35	87.5	A	Acceptable
Res 29	36	90.0	A+	Acceptable
Res 30	40	100.0	A+	Acceptable
Res 31	36	90.0	A+	Acceptable
Res 32	34	85.0	A	Acceptable
Res 33	33	82.5	A-	Acceptable
Res 34	35	87.5	A	Acceptable
Res 35	39	97.5	A+	Acceptable
Res 36	21	52.5	D	Marginal
<b>Average</b>	<b>31.9</b>	<b>80.42</b>	<b>A-</b>	<b>Acceptable</b>

The mean SUS score was calculated as follows:

$$\bar{X} = \frac{2895}{36} = 80.42 \approx \textit{Acceptable}$$

Based on the Bangor et al. adjective rating scale, a score of 80.42 falls into the Grade A- (Excellent) category and is deemed Acceptable. This indicates that the "Medimate" prototype successfully meets usability standards for further development.

The SUS score of 80.42 exceeds the industry benchmark of 68.0 by 12.42 points, placing "Medimate" in the 90th percentile of usability standards. Individual item analysis revealed strongest performance in: a) Learnability: Items 3, 7, 9 (ease of finding information, confidence in use, quick learning); b) Satisfaction: Items 5, 10 (interface appeal, frustration levels).

Weakest performance was noted in: a) Complexity Perception: Items 2, 6 (initial confusion, learning curve) and b) Integration: Items 4, 8 (feature organization, navigation clarity) This pattern suggests that while the overall design is excellent, onboarding improvements could further reduce initial user confusion.

**Table 6.** Outlier Respondent Score

Respondent ID	SUS Score	Grade	Acceptability	Deviation from Mean
<b>Res 27</b>	15.0	F	Not Acceptable	-65.42
<b>Res 10</b>	50.0	D	Marginal	-30.42
<b>Res 18</b>	52.5	D	Marginal	-27.92
<b>Res 36</b>	52.5	D	Marginal	-27.92
<b>Mean</b>	<b>80.42</b>	<b>A-</b>	<b>Acceptable</b>	-





The presence of outliers, while not negating the overall positive results, highlights important considerations for inclusive design as follows: a) Onboarding Improvements, A guided tutorial could help users with lower digital literacy understand prototype limitations and navigate core features more confidently; b) Accessibility Features Future iterations should incorporate accessibility options (larger text, high contrast mode, voice navigation) to accommodate diverse user capabilities; c) Device Testing Expanded testing across various device types and screen sizes would identify compatibility issues that may contribute to low usability scores; d) Clear Communication Explicitly communicating prototype limitations before testing may reduce frustration from unmet expectations about functionality.

These findings suggest that while "Medimate" achieves excellent usability for the target demographic, additional design considerations are needed to ensure accessibility for users with varying levels of digital literacy and technical capabilities.

### 3.6 Discussion

The obtained SUS score of 80.42 signifies that the "Medimate" prototype exceeds the industry average benchmark of 68.0, placing it in the 90th percentile of usability standards. This result is statistically significant as it demonstrates that a user-centered design approach can yield usability metrics comparable to established market leaders. For instance, Halodoc scores 82.21, while Alodokter scores 75.12. "Medimate" approaches Halodoc's usability despite being a prototype, suggesting that early-stage UX investment can bridge the quality gap often seen in new digital health initiatives.

These findings align with Wardani et al. (2023), who reported a SUS score of 93.25 for a home care app using Design Thinking, reinforcing the method's efficacy in health contexts. However, "Medimate's" score is slightly lower than Wardani's but significantly surpasses Sari et al. (2025), who found Mobile JKN scored only 63.3. This comparison highlights that while government-led initiatives may struggle with UX, private-sector standards (or prototypes adhering to them) can achieve higher user satisfaction.

The success of "Medimate" can be attributed to the Design Thinking framework, which ensured design decisions were rooted in empirical user needs rather than assumptions. Specifically, the "Empathize" stage uncovered critical pain points regarding cost transparency and navigation, which were directly addressed in the "Define" and "Ideate" stages. The addition of SUS provided an objective quantitative layer to validate these qualitative insights. Without the iterative prototyping cycle, the final design might have retained the navigation ambiguities identified initially, likely resulting in a lower SUS score.

### 3.7 Limitations and Implications

While the results are promising, several limitations must be acknowledged. First, the study is limited to high-fidelity prototyping; functional backend implementation and server-side performance metrics were outside the scope. Second, the sample size (N=36), while sufficient for usability testing, limits the statistical generalizability across broader demographic segments, particularly elderly users who are significant consumers of healthcare services. Third, outlier analysis revealed two respondents (5.5%) scored below the acceptability threshold (SUS < 68). This variance suggests that while the design is generally intuitive, it may present barriers for users with lower digital literacy, highlighting the necessity of inclusive design practices beyond standard user personas.

Despite these limitations, the implications for practice are significant. For developers, "Medimate" provides a validated design blueprint that prioritizes user empathy, reducing the risk of post-launch redesigns. For policymakers, the findings underscore the necessity of integrating minimum usability standards (e.g., SUS > 70) into health app certification processes. Future research should proceed to functional implementation, incorporate security audits (e.g., HIPAA/PDPA compliance), and expand testing to include elderly demographics. Additionally, integrating AI-driven features and using complementary evaluation methods like UEQ is recommended to further enhance engagement and measurement validity.





## 4. CONCLUSION

This study successfully designed a health application prototype, "Medimate," using the Design Thinking method to address usability gaps in Indonesian digital health services. The primary objective was to create a user-centered interface and evaluate its effectiveness using the System Usability Scale (SUS). The results demonstrate that the prototype achieved a SUS score of 80.42, classified as Grade A- (Excellent). This confirms that the five-stage Design Thinking process effectively resolved identified user pain points regarding navigation transparency and information hierarchy. The findings offer a validated design blueprint for practitioners, emphasizing that user-centered design reduces post-launch redesign risks.

However, limitations exist. The study is confined to a high-fidelity prototype without backend coding, and the sample size (N=36) limits broad demographic generalizability. Security and performance metrics were also outside the scope. Future research should proceed to functional implementation, incorporate security audits, and expand testing to include elderly demographics. Integrating AI-driven features and complementary evaluation methods like UEQ is also recommended. Ultimately, "Medimate" proves that user-centered design is critical for acceptable and effective health applications, contributing to Indonesia's digital health transformation goals.

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