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Development and Evaluation of AI - Driven Telehealth Application Using User Experience Questionnaire and Usability Testing

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Abstract

Persistent inequities in access to healthcare services remain a major public health challenge in the Philippines, particularly in rural and underserved communities where shortages of health professionals persist, reflected in a doctor-to-patient ratio of approximately 1:33,000. Digital health interventions, including telehealth, are increasingly recognized as system-level strategies to strengthen primary care and promote equitable access. This study evaluated Medee, an AI-driven telehealth platform designed to support early health-seeking behavior through semi-autonomous triage, symptom assessment, and health education, aligned with the WHO Global Strategy on Digital Health 2020–2025.

A mixed-methods evaluation was conducted integrating usability testing, the 12-item User Experience Questionnaire (UEQ), the System Usability Scale (SUS), and thematic analysis of open-ended user feedback. A total of 200 participants completed the assessment. UEQ results demonstrated high user acceptability, with Attractiveness (M = 1.84), Perspicuity (M = 1.61), Stimulation (M = 1.81), and Novelty (M = 1.92) rated as Excellent, and Efficiency (M = 1.50) and Dependability (M = 1.31) rated as Good. The mean SUS score of 78 placed the platform within the 80th–85th usability percentile. Qualitative findings highlighted perceived intuitiveness, motivational design, and support for timely health decision-making, with users identifying strong potential for hybrid care integration. However, usability challenges were noted among older and lower-literacy users, and demographic analysis revealed a predominantly young, urban, and educated user base, underscoring persistent digital equity gaps.

These findings indicate that AI-enabled telehealth platforms such as Medee can enhance health system responsiveness and access when implementation strategies explicitly prioritize inclusive design, digital literacy support, and integration within existing primary care and community health infrastructures.

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Introduction

The healthcare landscape in the Philippines faces significant challenges characterized by inequitable access to healthcare services, particularly in geographically isolated and disadvantaged areas. With a doctor-to-patient ratio of 1:33,000—far above the WHO-recommended 1:1,000—and 70% of Filipino doctors practicing in urban centers, rural populations experience severe healthcare disparities [1]. The COVID-19 pandemic further exacerbated these challenges, exposing critical gaps in healthcare delivery and prompting a rapid shift toward digital health solutions. In addition, many hospitals reached full capacity, with emergency rooms and intensive care units overwhelmed by a surge of critically ill patients. According to the Department of Health (DOH), the Philippines needs to triple its hospital bed capacity to meet the demands of the country's growing population and address future health emergencies effectively [2].

Telehealth adoption in the Philippines has accelerated significantly, with the DOH reporting a 300% increase in telehealth consultations between 2020 and 2022. A recent national survey indicated that 62% of urban Filipinos and 38% of rural Filipinos have used at least one telehealth service, primarily for primary care consultations and medication refills. This upsurge was driven mainly by increased mobile phone usage, which coincided with the rise in COVID-19 cases [3,4]. However, these gains have not translated into equitable healthcare access for all. Older adults, rural residents, and populations with lower digital literacy continue to be underserved, highlighting persistent digital divides and structural inequities in telehealth implementation [5].

Despite this growth, most existing telehealth applications in the Philippines operate on a synchronous, physician-dependent model. These platforms often follow a direct one-to-one consultation structure that creates bottlenecks in service delivery due to the limited number of healthcare professionals. This model struggles to scale effectively during peak demand, such as infectious disease outbreaks, and reinforces geographic and resource-based disparities. A study by Marcelo et al. [6], found that 73% of telehealth users reported dissatisfaction with consultation wait times, and 68% indicated difficulties accessing educational content relevant to their health concerns. In this context, the current model proves insufficient to meet widespread public health needs.

As the need for scalable, inclusive, and efficient digital health systems becomes increasingly urgent, AI-powered telehealth models have emerged as a promising alternative. These systems can provide automated triage, real-time health education, and tailored care pathways based on user input—functions that reduce reliance on human clinicians while maintaining quality care. The World Health Organization (WHO) has recognized the critical role of digital health in addressing global health disparities. Its Global Strategy on Digital Health 2020–2025 advocates for the integration of digital innovations that are scalable, equitable, interoperable, and person-centered to accelerate progress toward universal health coverage [7].

In alignment with this strategy, Medee was designed to address public health imbalances by automating common healthcare functions and reducing barriers to care for underserved populations. To ensure user-centered development, this study applies both usability testing and the User Experience Questionnaire (UEQ) to assess Medee's performance across functionality, engagement, and accessibility.

The Rise of Mobile Health (mHealth) Technology

Mobile health technology represents a paradigm shift in healthcare delivery, offering unprecedented opportunities to extend health services. The World Health Organization (WHO) defines mHealth as medical and public health practices supported by mobile devices such as smartphones and wearables, which come in downloadable applications that can be used either by the person or patient directly or by a healthcare provider [8,9]. The emergence of mHealth platforms, driven by advancements in mobile technology and growing healthcare demands, presents advantages and challenges.

There exists a concern on the ethical dimensions of mHealth technologies, highlighting their potential to improve healthcare access while raising concerns about privacy, autonomy, and inequalities, particularly for marginalized communities with limited access to technology and digital skills [10]. It is often argued that commodifying health data, often shared on social media or sold to third parties, raises privacy issues and increases the risk of discrimination, especially for vulnerable groups. As mHealth services blur the line between lifestyle applications and essential healthcare tools, they present unique governance challenges. Therefore, assessing the ethical implications of these platforms within the broader social and technological context is crucial, encouraging a thoughtful integration of technology in health.

However, recent studies have documented the successful implementation of mHealth applications in various contexts within the Philippines. Mobile-based health interventions in rural Philippines improved vaccination rates by 27% and prenatal care attendance by 32% [11]. In urban settings, particularly during the COVID-19 pandemic, mHealth applications helped reduce hospital visits, minimized population mobility, and enabled remote monitoring and symptom management [12]. Similarly, mHealth platforms facilitated effective disease surveillance during dengue outbreaks, enabling more timely responses and potentially reducing mortality rates [13]. These findings suggest that well-designed mHealth applications can effectively address critical healthcare challenges in the Philippine context.

Telehealth Evolution and Integration of Artificial Intelligence

The evolution of telehealth has progressed from simple video consultations to sophisticated platforms incorporating artificial intelligence. This evolution is characterized into three generations: first-generation telehealth focused on remote consultations; second-generation incorporating remote monitoring and basic triage; and third-generation integrating AI for predictive analytics, personalized care recommendations, and autonomous patient management [14].

Integrating AI into telehealth platforms represents a significant advancement, enabling capabilities beyond traditional telemedicine. The integration of AI has several applications in healthcare delivery, including automated diagnosis, clinical decision support, patient engagement, and administrative workflow optimization. In the context of telehealth, these capabilities translate to intelligent triage systems, personalized health coaching, early disease detection, and optimized resource allocation [15]. It is suggested that AI algorithms can achieve diagnostic accuracy comparable to, or even surpassing, that of human specialists in specific fields, particularly dermatology, radiology, and ophthalmology; with a Philippine study reporting a 32% enhancement in in diagnostic accuracy after implementing AI decision support systems within telehealth platforms utilized by rural health units [16,17]. This improvement was attributed to AI models' advanced data analysis capabilities, which enables healthcare providers to make more informed decisions by integrating patient symptoms with a vast database of medical knowledge. When integrated into telehealth platforms, these algorithms not only enhance the capabilities of healthcare providers but also facilitate better patient outcomes in remote areas where access to specialized medical care is often limited.

For Medee, Google's Gemini was selected as the AI large language model due to several considerations. First, Gemini contains a family of models developed specifically for the medical domain; termed as Med-Gemini, adapting Gemini's native abilities to provide accurate, context-sensitive medical reasoning and decision support. Second, Gemini possesses a higher degree of correctness and accuracy at 77.2% and 68.0%, respectively, when compared against other language models such as GPT-4 at 54.0% correctness and 49.2% accuracy with regards to providing references related to its reasoning. Third, Gemini's seamless integration with Medee's system architecture via Google Cloud ensures efficient deployment and scalability [18,19]. The utilization of Google Cloud provides a robust and flexible foundation that allows Medee to leverage Gemini's AI capabilities effectively. Through containerization and managed services like Vertex AI, Medee can deploy, scale, and manage Gemini models with minimal overhead. This integration additionally enables real-time AI-powered functionalities such as intelligent triage, clinical decision support, and personalized health coaching while ensuring high availability and low-latency performance. Lastly, Gemini's certifications in ISO 27001 and HIPAA offer strong assurances of data security and privacy, aligning perfectly with Medee's commitment to protecting patient information.

Usability in Health Technology Applications

The International Organization for Standardization (ISO) defines usability in ISO 9241-11:2018 as "the extent to which specified users can use a product to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use" (ISO, 2018). This definition underscores the multidimensional nature of usability, encompassing functional performance, user perception, and context-dependent factors. Usability is often conceptualized through both pragmatic and hedonic dimensions, with effectiveness and efficiency aligning with pragmatic quality, and satisfaction mapping to hedonic quality [20].

In the context of healthcare technology, usability is particularly crucial due to the significant consequences that can arise from poor design that may affect clinical decision-making. The ease of use, reliability, and interface quality are critical factors in enhancing patient engagement with telemedicine platforms [21,22]. This aligns with the pragmatic dimension of usability, as ease of use and reliability enhance task performance. Furthermore, usability issues such as poor informative architecture, or complex navigation in health technology can lead to medical errors, decreased adoption rates, and ultimately jeopardize patient safety [23]. Their systematic review revealed that usability challenges are among the primary barriers in achieving sustained engagement between patients and telehealth applications.

In addition, the extent of technological experience among healthcare providers also significantly impacts the success of telehealth systems implementation. Perceived usefulness and ease of use were identified as key determinants for healthcare professionals' adoption of telehealth systems. It was also determined that adoption rates typically suffer when telehealth platforms require extensive training or disrupt established workflows [24]. These highlight the need for usability testing that includes patients and healthcare providers as key stakeholders.

In the Philippine context, the evaluation of the usability of five commonly used telehealth applications, found a significant variability in usability scores. Applications designed with consideration for the specific technological literacy levels, connectivity constraints, and cultural preferences of Filipino users demonstrated substantially higher adoption and retention rates. This underscores the importance of context-specific usability evaluations rather than relying solely on existing generic principles [25].

Despite the growing literature on usability in health technology, gaps remain. For instance, few studies have examined usability in AI-driven health applications or evaluated the experiences of both patients and healthcare providers within the same study, particularly in the Philippine setting. This highlights the need for comprehensive, contextually grounded usability evaluations that address both pragmatic and hedonic dimensions of user experience. Addressing these gaps will inform the design of health technologies that are not only functionally effective but also user-centered and culturally relevant.

Contextual Considerations for the Philippines

The development and evaluation of telehealth platforms in the Philippines require careful consideration of contextual factors that may influence adoption and effectiveness. Several key considerations specific to the Philippine context are identified and considered [26]:

- **Technological Infrastructure:** Although smartphone penetration is high at around 72% as of 2023, internet connectivity varies significantly across the archipelago. Rural areas often experience much lower bandwidth and reliability [27]. Therefore, telehealth applications must be designed with offline capabilities and low-bandwidth optimization.
- **Digital Literacy:** Digital literacy levels vary

substantially across age groups and geographical regions. While 85% of Filipino users aged 18-35 can navigate digital health interfaces independently, this figure drops to 37% for users over 60, highlighting the need for age-appropriate design considerations [28,29].

- Language Preferences: While English is widely understood, users demonstrated significantly better comprehension and engagement when telehealth applications offered content in local languages (particularly Tagalog, Cebuano, and Ilocano) [30]. Given that there are over a hundred languages in the Philippines, multilingual support is a critical factor for inclusive telehealth design.
- Healthcare System Integration: Integration with existing healthcare systems presents technical and organizational challenges. It is imperative to emphasize the importance of interoperability with both public and private healthcare information systems and alignment with the Philippine Health Insurance Corporation (PhilHealth) reimbursement processes [31].
- Cultural Attitudes Toward AI: Public perceptions of AI in healthcare contexts vary considerably. A national survey conducted revealed that 72% of respondents expressed openness to AI-assisted diagnosis, 58% voiced privacy concerns, and 63% indicated a preference for human oversight of AI recommendations [32]. This suggests the need for transparent AI design that emphasizes the complementary role of technology alongside human providers.

These contextual factors underscore the critical need for tailored approaches in the development and evaluation of AI-driven telehealth platforms, specifically for the Philippines. Given the country's unique socio-economic conditions, healthcare systems, and cultural nuances, it is imperative to create solutions that address local needs rather than merely importing solutions designed for different contexts. Implementing such solutions ultimately ensures better accessibility, usability, and effectiveness of patient care.

Methodology

This study employed a convergent parallel mixed-method design, combining quantitative and qualitative analyses to evaluate the Medee AI-driven telehealth platform comprehensively. The quantitative component utilized a 12-item version of the User Experience Questionnaire (UEQ) to gather empirical data regarding users' perceptions of the Medee application across multiple dimensions. Concurrently, the qualitative component involved usability testing to identify specific usability issues and gather detailed feedback for platform improvement.

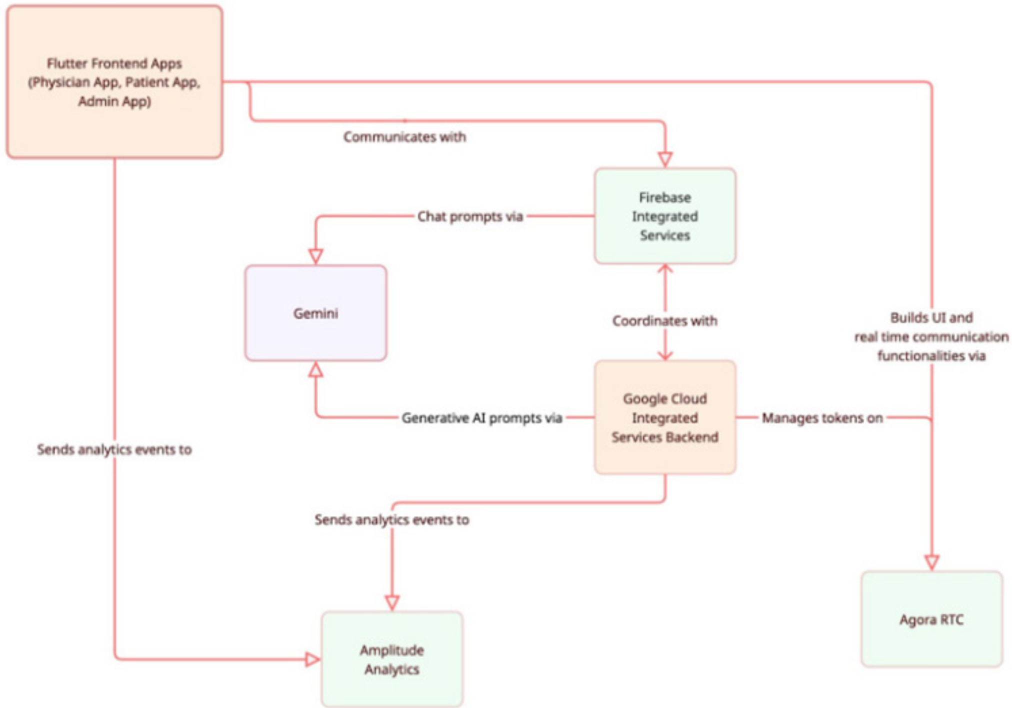
This methodological triangulation reinforces the validity of the findings by leveraging the complementary strengths of each approach to determine a convergent result. The User Experience Questionnaire (UEQ) offers standardized metrics for comparing the platform against established benchmarks, while usability testing provides in-depth insights into user behavior, challenges, and preferences. This combination is particularly valuable for evaluating health technology applications where both objective performance metrics and subjective user experiences significantly influence adoption and effectiveness.

Development of the Medee Platform

The Medee telehealth platform features a comprehensive architecture comprising three main application components: Medee for patients, Medee for clinicians, and Medee for administrators. All three applications were built using Flutter to ensure cross-platform compatibility across iOS and Android devices while maintaining a consistent user experience.

System Architecture

Figure 1: A Diagram that Highlights the Medee System Architecture.



The system architecture integrates several key technological components:

a) **Flutter Frontend Applications:**

- **Medee for patients** - enables patient users to communicate with physicians, track their medical journey, and access smart targeting educational content.
- **Medee for clinicians** - provides physicians the ability to communicate digitally with their patients, provide care through digital medical assessment, digital prescriptions, and digital lab requests.
- **Medee for administrators** - enables administrators to monitor operational activity, manage users, view feedback, and other administrative functionalities.

b) **Firebase Backend Services:**

- **Authentication** - manages user authentication using phone number verification.
- **Firestore and Data Connect** - stores and manages application data, including user profiles, medical records, and messaging.
- **Cloud Messaging** - delivers push notifications for appointment reminders and communication alerts.
- **Cloud Functions** - executes backend code in response to events and HTTP requests.
- **Storage** - handles user-generated content such as profile pictures and medical documents.

c) **Google Cloud Platform (GCP) Services:**

- **Cloud Functions/Cloud Run** - provides serverless environments for backend processing.
- **Vertex AI** - Used for integrating Gemini, providing the necessary infrastructure and tools to deploy and manage the AI model.
- **Cloud Logging and Monitoring** - tracks application events and performance metrics.
- **API Gateway** - manages and secures API endpoints.

d) **AI Integration (Google's Gemini):**

- **Natural Language Processing** - processes user inquiries in multiple languages, including English and Filipino.
- **Virtual Health Assistant** - generates intelligent responses to health-related queries.
- **Educational Content Generation** - creates personalized health education materials.

- Symptom Analysis Support - assists in the preliminary assessment of reported symptoms.

e) **Real-time Communication:**

- Agora RTC - facilitates secure video and voice consultations between patients and healthcare providers.
- Token management through Google Cloud services ensures secure connections.
-

f) **Analytics Integration:**

- **Amplitude Analytics** - captures user behavior data from both applications and backend services.
- This provides insights into engagement patterns, feature utilization, and performance metrics.

The data flow within the architecture follows a secure pathway where user interactions from the Flutter applications communicate with Firebase for data storage and authentication. For AI-driven features, Firebase routes user prompts to Gemini, which processes these prompts and generates appropriate responses. The Google Cloud backend handles more complex operations, including token management for real-time communication and push notification delivery.

The architecture implements multiple security measures, including Firebase security rules, strong authentication protocols, API endpoint security, data encryption, and role-based access control. The system was designed with scalability, leveraging serverless architecture components that automatically scale based on demand, ensuring reliable performance even during peak usage.

Before deployment, all system components underwent comprehensive testing with particular attention to the AI elements, which were validated by a panel of five healthcare professionals specializing in primary care, infectious diseases, and public health.

Evaluation Framework and Data Collection

The evaluation of the Medee platform followed a two-phase approach:

Phase 1: User Experience Questionnaire (UEQ)

The UEQ was administered to evaluate users' perceptions across six dimensions: attractiveness, efficiency, perspicuity, dependability, stimulation, and novelty. A minimum sample size of 30 respondents was targeted to ensure reliable results. The sampling technique used was convenience sampling to ensure participants had relevant experience with the application and were at ease of access and proximity. The questionnaire was implemented using Google Forms and included the following:

- Basic demographic information (age, sex, educational attainment, city / province of residence, region of residence, and frequency of telehealth use)
- A short 12-item UEQ using semantic differential scales
- A short 10-item SUS using quick and reliable assessment
- An open-ended question for additional feedback

Data was collected over four weeks from June 1, 2024, to June 28, 2024. The UEQ was distributed through in-app invitations for existing Medee users who had completed at least one consultation and direct email invitations to registered users who have used the platform at least once.

Phase 2: Usability Testing

Following Nielsen's (2019) recommendation that 3-5 participants can identify approximately 85% of usability issues, we recruited 5 participants for usability testing. Participants were selected from UEQ respondents who indicated willingness to participate in further research and represented diverse demographic profiles and usage patterns.

Usability testing was conducted remotely using the Zoom platform, with sessions recorded with participant consent. Each session lasted approximately 60 minutes and followed a structured protocol:

- **Introduction and briefing (5 minutes):** Explanation of session's purpose and structure
- **Pre-test interview (10 minutes):** Collection of background information and experience with telehealth applications
- **Task completion (30 minutes):** Participants completed a series of representative tasks while thinking aloud
- **Post-test interview (15 minutes):** Reflection on experience, challenges, and suggestions for improvement
- The usability testing scenarios were designed to cover the core functionalities of the Medee platform, with special attention to AI-assisted features during actual physician consults:

Scenario 1: Symptom Assessment and Triage. "You have been experiencing a fever of 38°C, headache, and body aches for the past two days. Use Medee to assess your symptoms and determine what action you should take."

Scenario 2: Teleconsultation with AI Assistance. "You decide to consult a doctor based on the symptom assessment. Schedule a teleconsultation with a general practitioner for the earliest available appointment, and prepare questions about your condition using the AI assistant feature."

Scenario 3: Health Information Retrieval. "You want to learn more about dengue fever, which is currently seeing an outbreak in your area. Use Medee to find information about prevention measures, symptoms, and when to seek medical attention."

Scenario 4: Medication Reminder Setup. "Your doctor has prescribed paracetamol to be taken every 6 hours. Set up a medication reminder in the Medee app."

Scenario 5: Access and Share Health Records. "You must share your recent consultation record and prescription with a family member. Access your health record and share it securely."

The moderator maintained a non-interventionist approach during task completion, only assisting if the participant could not proceed after multiple attempts. During each task, the moderator observed and recorded:

- Task completion (Success/Failure): Whether the participant was able to successfully complete the task without assistance.
- Time on task: The duration taken to complete each task.
- Number and type of errors: The frequency and nature of mistakes made while attempting the task.
- Instances of hesitation or confusion: Observable moments when the participant paused or appeared uncertain about how to proceed.
- Comments or expressions of frustration/satisfaction: Verbal or non-verbal cues indicating positive or negative emotional responses during task performance.
- Questions or requests for help: Any questions asked or help requested by the participant indicating points of difficulty or misunderstanding.

Population and Sample

The target population for the UEQ was existing users of the Medee telehealth platform who had completed at least one transaction or consultation through the application.A total of 213 responses were collected. After cleaning the data by removing duplicates and incomplete responses, 200 valid responses remained for analysis. This sample size substantially exceeded the minimum recommendation of 30 respondents suggested in the UEQ handbook [34], enhancing the reliability of the results.

The demographic profile of UEQ respondents was as follows:

- Age distribution: 96.5% in the 18-24 age group, 2% in the 25-31 age group, 1% in the 32-38 age group, 0% in the 39-45 age group, and 0.5% in the 46-50 age group.
- Sex distribution: 31% male, 68% female, and 1% preferred not to say.
- Educational attainment: 0% no formal education, 0% primary education (grades 1-6), 0% junior high school (grades 7-10), 33.5% senior high school (grades 11-12), 59.5% college graduate / graduating candidate, 0% vocational training program, and 6% postgraduate.
- City / Province of Residence: 54.5% in urban settings and 45.5% in rural settings.
- Region of Residence: 2% in Region I, 5% in Region II, 11% in Region III, 34% in Region IV-A, 4% in Region IV-B, 5% in Region V, 0.5% in Region VI, 1% in Region VII, 0.5% in VIII, 0% in Region IX, 0% in Region X, 1% in Region XI, 0% in Region XII, 0% in Region XIII, 35.5% in NCR, 0.5% in CAR, and 0% in BARMM.
- Frequency of Telehealth (Medee) Use: 22.5% of respondents using telehealth regularly, 77.5% of respondents using telehealth occasionally, and 0% of respondents never using telehealth.

For usability testing, five participants were selected from the pool of UEQ respondents who indicated a willingness to participate in follow-up research, with the selection criteria aimed at creating a diverse sample representing different user profiles.

All participants provided informed consent before participating in the UEQ survey or usability testing sessions. For the UEQ survey, the online questionnaire began with an information sheet explaining the study's purpose, data handling procedures, and participant rights. Respondents indicated their consent by proceeding with the questionnaire.

For the usability testing sessions, participants were given a detailed consent form prior to the session. This form explained the recording procedures, data usage, and confidentiality measures. Participants were informed of their right to withdraw from the study at any time without penalty.

All collected data was anonymized during analysis and reporting. Usability testing recordings were stored on encrypted drives and will be deleted six months after the study's completion. The study adhered to the Philippine Data Privacy Act of 2012 and institutional ethical guidelines. All electronic data were stored in encrypted, access-controlled environments. When applicable, data processed through Gemini AI were handled via Google Cloud Platform (GCP), which is compliant with international data protection standards such as ISO 27001 and HIPAA.

Data Analysis Methods

The UEQ data was analyzed using the official UEQ Data Analysis Tool (version 8) [34]. This Excel-based tool calculates mean values, standard deviations, and confidence intervals for the six UEQ scales: attractiveness, efficiency, perspicuity, dependability, stimulation, and novelty.

On the other hand, qualitative data from usability testing sessions were analyzed using a thematic approach, which included:

Data Familiarization: Reviewing recordings and notes from all sessions

Initial Coding: Identifying and labeling segments where participants encountered difficulties or expressed opinions about the interface

Theme Generation: Grouping codes into broader themes representing common usability issues or patterns of user behavior

Theme Review: Refining themes to ensure they accurately represented the data and addressed the research questions

Issue Severity Rating: Assigning severity ratings to identified usability issues using Nielsen's (1994) scale:

- 0: Not a usability problem
- 1: Cosmetic problem only
- 2: Minor usability problem
- 3: Major usability problem
- 4: Usability catastrophe

For each identified issue, the analysis documented the description of the issue, number of participants who encountered it, severity rating, impact on task completion, and potential design solutions. Task performance metrics (completion rates, time on task) were also calculated to provide quantitative usability measures alongside the qualitative findings.

Results and Discussion

Contextually, a total of 213 responses were collected and subjected to processing, however, due to some responses not consenting to data collection, a total of 200 respondents remain available for data analysis and interpretation. Summarized in Table 1 is the basic demographic information of the respondents.

Table 1: Basic Demographic Information of the Research Respondents.

Variables	Categories	Frequency (N)
Age (in years)	18-24	193
	25-31	4
	32-38	2
	39-45	0
	46-50	1
Sex	Male	62
	Female	136
	Prefer not to say	2
Educational Attainment	No formal education	0
	Primary education (Grades 1-6)	0
	Junior High School (Grades 7-10)	0
	Senior High School (Grades 11-12)	67
	College graduate / Graduating candidate	119
	Vocational training program	0
	Postgraduate	12
City / Province of Residence	City	109
	Province	91
Region of Residence	Region I	4
	Region II	10
	Region III	22
	Region IV-A	68
	Region IV-B	8
	Region V	10
	Region VI	1
	Region VII	2

	Region VIII	1
	Region IX	0
	Region X	0
	Region XI	2
	Region XII	0
	Region XIII	0
	NCR	71
	CAR	1
	BARMM	0
Frequency of Telehealth (Medee) Use	Regularly	45
	Occasionally	155
	Never	0

As presented in Table 1, the sample was heavily skewed toward young, educated, urban users. Nearly all respondents (96.5%) were 18–24 years old, reflecting a predominantly youthful cohort. This age concentration likely reflects the demographic most comfortable with mobile technology and telehealth; indeed, it was reported that 85% of Filipinos aged 18–35 can navigate digital health apps independently, versus only 37% of those over 60 [28,29]. In contrast, very few older adults participated, underscoring known digital literacy gaps by age in the Philippines. The majority of respondents were female (68%), a pattern often seen in health service studies and consistent with prior surveys of telehealth users. Educationally, all participants had at least secondary schooling; most were college graduates. This high education level aligns with literature suggesting that telehealth adoption tends to be greater among more educated individuals with higher digital literacy.

Geographically, users were concentrated in Metro Manila and nearby regions. About 36% lived in the National Capital Region and another 34% in Region IV-A, with far fewer respondents from rural areas. This urban predominance mirrors national telehealth usage patterns: a survey found that 62% of urban Filipinos have used telehealth versus only 38% of rural residents. While smartphone ownership is high (~72% nationwide), rural connectivity remains uneven. Limited internet access and infrastructure in remote areas likely contribute to the lower rural uptake of Medee.

Frequency of Medee use was modest: only 22.5% of respondents used the app regularly, while 77.5% reported occasional use (with none reporting “never”). This suggests that while many tried the platform, fewer became frequent users. Such drop-off is common in mHealth: engagement tends to wane over time unless refreshed by new features or content. For example, long-term use of a health app declined as initial novelty wore off. The predominance of occasional users in our data highlights the challenge of sustaining user engagement, a finding echoed in engagement studies of health applications [35]. In sum, the demographic profile, young, female, urban, and educated, aligns with known patterns of digital health use in the Philippines, but also highlights digital equity concerns: vulnerable populations (older, rural, less-educated) were under-represented.

The observed demographic skew further accentuates critical equity gaps in digital health access and use. Underrepresentation of older adults, rural populations, and individuals with limited educational attainment raises important questions about the inclusiveness of Medee’s current reach. These are the very populations that could benefit most from remote health innovations, particularly in contexts where access to physical health infrastructure is limited. Medee’s telehealth and AI-driven functionalities present a scalable means to bridge this healthcare access gap, especially if future deployment includes culturally and contextually adapted outreach models.

Moreover, the demographic profile observed in Table 1 reflects broader structural challenges related to digital infrastructure, education, and socioeconomic conditions that influence the uptake of health technology. Digital health systems that do not proactively address these barriers risk reproducing or exacerbating health inequities. As such, targeted strategies, such as regional language localization, community training programs, interface simplification, and offline functionalities, are recommended to reach broader, digitally excluded populations [5]. Deliberate inclusion efforts will be essential if Medee is to align fully with the WHO's vision of equitable, inclusive, and person-centered digital health systems [36].

User Experience Questionnaire (UEQ)

Table 2 : User Experience Questionnaire (UEQ) Results for the Medee Telehealth Platform.

UEQ Scale	Mean Score	Standard Deviation	Confidence Interval (±0.95)	Benchmark Interpretation
Attractiveness	1.84	0.9	±0.13	Excellent
Perspicuity	1.61	1	±0.14	Excellent
Efficiency	1.5	1.02	±0.15	Good
Dependability	1.31	0.95	±0.14	Good
Stimulation	1.81	0.93	±0.13	Excellent
Novelty	1.92	0.9	±0.13	Excellent

The UEQ results indicate very positive user experience across most dimensions. As shown in Table 2, four of six scales (Attractiveness, Perspicuity, Stimulation, Novelty) achieved mean scores above 1.8, placing them in the "Excellent" category by UEQ benchmarks. The remaining scales, Efficiency (M = 1.50) and Dependability (M = 1.31), were rated "Good," indicating satisfactory but comparatively lower performance. High Perspicuity (1.61) suggests that users found Medee intuitive and easy to understand. This is important because prior work has shown that perspicuity strongly predicts satisfaction with health apps: ease-of-learning was among the strongest predictors of overall satisfaction in mobile health applications. The excellent Attractiveness score (1.84) indicates a very positive overall impression, reflecting pleasing design and interface quality [37,38].

The good ratings on Efficiency and Dependability suggest areas for improvement. Efficiency measures how quickly users can complete tasks. A mean of 1.50 (still above average) implies that while tasks were generally accomplished with moderate speed, there may have been occasional friction. Previous studies have observed that AI-enhanced telehealth apps can yield high efficiency ratings, but they also caution that unclear AI behavior can reduce user trust and perceived reliability. Medee's somewhat lower Efficiency and Dependability may reflect minor usability kinks or uncertainties in system response [39]. Dependability (mean 1.31) relates to user confidence that the app behaves predictably and meets expectations. The lower score here might indicate that users noticed occasional glitches or wanted more consistent performance. These findings suggest that, even with generally positive UX, further refinement of system reliability and task flow could raise these scores to the "Excellent" range.

In contrast, the hedonic (engagement-related) dimensions were rated very highly. Stimulation (M = 1.81) and Novelty (M = 1.92) reflect how engaging and innovative the app felt. These top scores imply that users found Medee motivating and fresh. This is an encouraging aspect, as hedonic qualities have been linked to sustained use: long-term patient engagement has demonstrated to be most strongly associated with high stimulation and novelty in a chronic-disease app [35]. In other words, features that make the app interesting and novel can help retain users over time. The fact that Medee's design elements score so well on these scales suggests it may captivate users beyond initial use. It is further noted that telehealth applications with higher overall UX ratings, including affective elements, tend to achieve better patient engagement, adherence, and even clinical outcomes [40]. Thus, Medee's strong performance on stimulation and novelty bodes well for its potential

Overall, the UEQ profile, with four "Excellent" and two "Good" dimensions, indicates a very favorable user experience. Users rated Medee's interface as appealing and easy to learn, and found its features engaging and innovative. These results compare favorably with benchmarks for health apps and suggest that the platform meets or exceeds typical UX standards. Literature supports the validity of these interpretations: for example, both pragmatic (efficiency, effectiveness) and hedonic (motivation, novelty) qualities are critical for technology acceptance. Medee's strengths in hedonic UX may help sustain its adoption, while the identified efficiency/dependability gaps point to targeted usability improvements [41].

System Usability Scale (SUS)

Table 3: System Usability Scale (SUS) Result for the Medee Platform.

Metric	Value
SUS Score	78
Usability Grade	B+
SUS Rank	B+ (Excellent)
Interpretation	A SUS score of 78 indicates that the system is considered highly usable and user-friendly; however, there is still some room for improvement.

As shown in Table 3, Medee achieved a System Usability Scale (SUS) score of 78, which corresponds to a B+ grade. This score is significantly above the industry average of approximately 68, placing Medee in the "Good" to "Excellent" usability range according to standard SUS benchmarks. The SUS complements the UEQ results by confirming that Medee is not only visually and experientially appealing but also functionally usable for the majority of users. High usability has consistently been linked with digital health engagement, particularly in first-contact platforms that aim to support triage, assessment, and patient decision-making [42,22]

The SUS results reinforce the interpretation that users were able to navigate Medee with confidence. This is especially important for health applications, where system complexity can discourage continued use. As prior research suggests, usability is one of the most important predictors of long-term adoption for AI-driven health technologies [43,44]. The WHO further stresses the significance of usability as a foundational aspect of quality in digital health implementation [45]. Medee's SUS score thus affirms its readiness for broader implementation and signals that users perceive the platform as reliable, accessible, and trustworthy.

The alignment between the UEQ and SUS scores also suggests a consistent user experience across both affective and practical domains. While the UEQ captures engagement and design impressions, the SUS confirms operational functionality. By definition, successful health platforms are those that balance emotional appeal with functionality, offering not only innovation and novelty but also clarity and efficiency in health interactions [37]. Medee appears to meet this balance.

In summary, the SUS rating of 78, together with UEQ performance, affirms that Medee is both user-friendly and effective, with usability levels that compare favorably to other telehealth applications evaluated in Southeast Asia and beyond. This dual validation supports its suitability for wider public deployment, especially as part of efforts to reduce health access disparities through digital interventions.

Figure 2. Chief Complaints by Medee Users

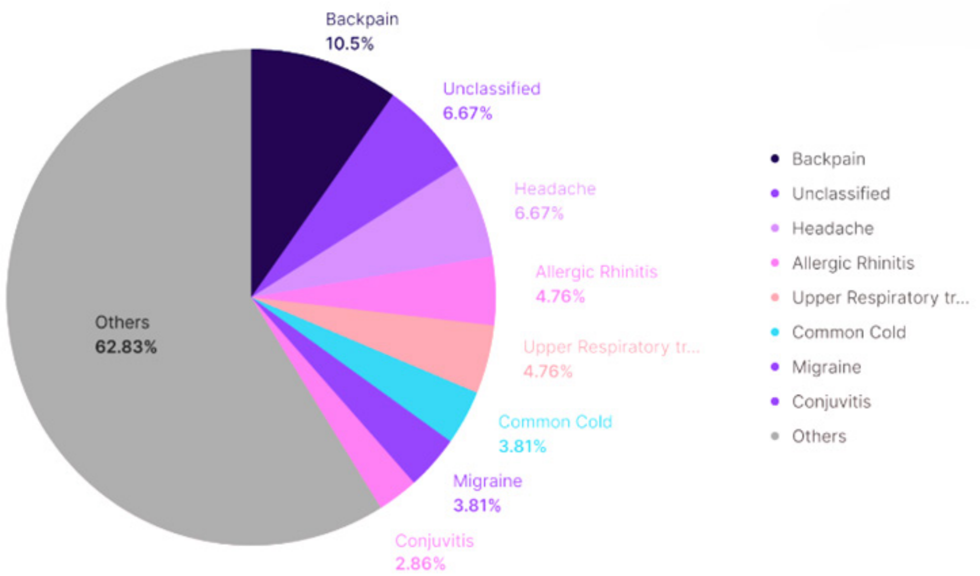


Figure 2 reveals that the most frequently encountered conditions among Medee users are back pain (10.5%), followed by unclassified symptoms (6.67%), headache (6.67%), allergic rhinitis (4.76%), upper respiratory tract infections (4.76%), common cold (3.81%), migraine (3.81%), and conjunctivitis (2.86%). A substantial portion, 62.83%, falls into the "others" category, indicating a broad range of less common complaints. The prominence of musculoskeletal (back pain), respiratory, and headache-related issues underscores both the burden of non-communicable conditions and the persistence of common acute illnesses among the user base.

Figure 3: Most Viewed Educational Content by the Medee Users.

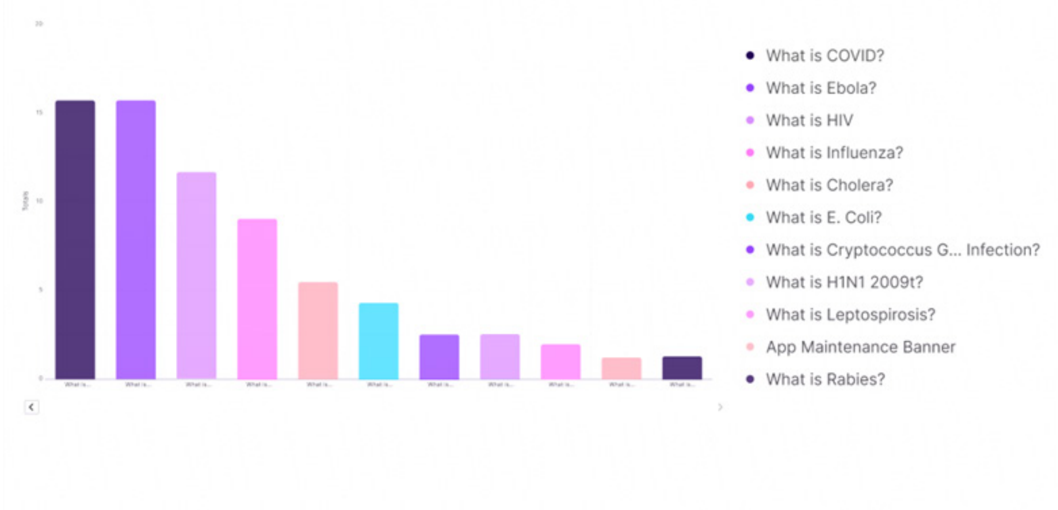


Figure 3 complements this clinical snapshot by highlighting the educational topics most frequently accessed by Medee users. The most viewed content revolves around infectious diseases like COVID-19, Ebola, HIV, Influenza, and Cholera, as well as general questions about conditions such as E. coli infection, cryptococcal infection, H1N1 2009, and leptospirosis. The presence of questions about app functions and rabies further underscores user interest in both platform navigation and pressing health threats. Users' focus on these topics reflects a widespread need for accurate, accessible information about major public health concerns, particularly those with high transmission potential or significant societal impact.

Conclusion

The synthesis of these findings indicates that Medee is well-positioned to address both usability challenges and long-standing public health imbalances in the Philippines. From a systems perspective, the platform demonstrates strong performance in terms of user experience, interface design, and accessibility across both quantitative and qualitative dimensions. These favorable results suggest readiness for wider adoption, but also highlight the necessity of targeted strategies to bridge current demographic and geographic disparities.

Medee's AI-based functionalities, including symptom checking, appointment scheduling, and health education, can directly support healthcare systems strained by uneven provider distribution and limited infrastructure, particularly in rural and peri-urban regions. In the Philippines, doctor-to-patient ratios in rural areas fall significantly below WHO's recommended minimum threshold [46,47]. By extending basic diagnostic support and facilitating virtual consultations, Medee offers a mechanism for shifting lower-complexity health services to digital platforms, thereby alleviating burden on overstretched primary care systems and improving system efficiency.

The results of the UEQ and SUS analysis indicated high levels of user satisfaction, particularly in perceived stimulation, novelty, and perspicuity, with four of six UEQ scales rated "Excellent" and the remaining two rated "Good." The SUS score of 78 reinforced these findings, placing Medee in the top usability percentiles for telehealth platforms. Qualitative feedback further validated the app's functionality and design while revealing opportunities for improvement, particularly in enhancing accessibility, interface aesthetics, and expanding hybrid care features. These insights highlight the importance of iterative, user-centered development to ensure ongoing relevance and adoption.

The analysis also revealed key structural considerations for future deployment. Despite the app's favorable reception among young, educated, urban users, challenges related to digital exclusion remain. Older adults, rural populations, and individuals with low digital literacy were underrepresented, suggesting that design adaptations, localized deployment strategies, and human-centered outreach are essential for achieving equitable impact. Additionally, real-world scaling of the platform requires integration with national health infrastructure, including electronic health records, referral systems, and multilingual support.

By demonstrating strong usability and positive user reception, this study positions Medee as a viable tool for augmenting primary healthcare services and supporting decentralized models of care. The platform's alignment with WHO's digital health objectives and national health system priorities, primarily in promoting ethical, safe, secure, and sustainable care, highlights its potential as a replicable model in low- and middle-income settings. Continued development should prioritize inclusivity, interoperability, and responsiveness to evolving public health demands to fully realize the platform's role in strengthening health system resilience and equity.

Recommendations

Building on the findings of this study and aligned with current literature and national strategies, the following recommendations are provided to inform future researchers, academic scholars, developers, and policymakers. These suggestions address persistent structural, technological, and sociocultural challenges that hinder the equitable deployment and scaling of AI-driven telehealth platforms in the Philippines:

- Strengthen digital health literacy. Future efforts should invest in targeted training programs for both patients and healthcare providers. Embedding digital health literacy into medical curricula and community outreach initiatives can empower users to navigate AI-driven platforms more effectively. As digital skills vary widely across age groups and socioeconomic contexts, community-based workshops and culturally sensitive modules in local dialects are essential (Ghosh et al., 2021). Future studies should also assess the impact of these interventions on user retention and care outcomes.
- Enhance EHR interoperability and data access. Telehealth systems should be designed to integrate seamlessly with existing electronic health records (EHRs) using open standards like HL7 FHIR. This will support continuity of care, reduce redundant data entry, and facilitate timely

clinical decisions (Adler-Milstein & Jha, 2017). Policymakers should support the creation of a national health information exchange infrastructure to enable standardized, secure data flows across facilities and systems.

- Design for constrained internet connectivity. Applications should be optimized for low-bandwidth environments typical of rural regions. Offline functionality, audio-only modes, and asynchronous consultations can expand usability in low-resource settings. Collaborations with telecommunications providers and investments in digital infrastructure are essential to support consistent access in underserved areas (ITU, 2020).
- Promote equity in access and design. Medee's future iterations must ensure cultural and linguistic inclusivity to serve marginalized populations. Localized content, UI adjustments for older adults, and partnerships with community health workers can reduce digital exclusion. Device subsidies and digital vouchers should be explored for economically disadvantaged groups (Lallana et al., 2022). Researchers should also analyze platform usage by demographic strata to proactively address service gaps.
- Foster trust through transparency and human oversight. All AI-generated recommendations should include interpretability features (e.g., reasoning traces or confidence scores) to enhance transparency and support clinician review. Establishing human-in-the-loop safeguards ensures clinical accountability and addresses ethical concerns (Jotterand & Bosco, 2022). Communication strategies must also clarify data security, consent, and usage policies to maintain public trust.

Conflicts of Interest

The authors declare that they have no conflicts of interest to report regarding the present study.

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