A comprehensive evaluation of the service quality of China's medical APP based on mobile phones

Zhihan Zhang

Shanghai Kongjiang Senior Highschool, Shanghai, 200433, China

1731620172@qq.com

Abstract. In light of the rapid advancement of internet-based healthcare and the consequent transformation in medical consultation modalities, an increasing number of individuals, particularly the younger demographic, are opting to seek medical advice or assistance via mobile phones through various online medical platforms or applications. However, the wide range of medical apps with different operational models, varying levels of expertise among resident specialists, and inconsistent quality of medical guidance presents a significant challenge for users in discerning which apps provide accurate and reliable guidance. Consequently, this study aims to comprehensively evaluate the service quality of domestic medical apps from multiple channels and perspectives by utilizing case studies. Rooted in educational materials and diagnostic guidelines for relative diseases, evaluation criteria and a quantitative scoring system are established in this study. The findings are indicated in terms of the accuracy and professionalism of medical consultation services and user experience. This study also proposes that domestic mobile medical apps should enhance their diagnostic quality, expand physician resources, standardize management practices, and strengthen platform infrastructure while developing new functionalities to benefit patients.

Keywords: Medical apps, Data analysis, Service quality, User perspective, Evaluation.

1. Introduction

As one of the most populous nations globally, China boasts an extensive user base of smartphones. With the proliferation of internet technology, smartphones are increasingly assisting individuals in various aspects of life, including seeking medical consultations. Presently, mobile medical apps have emerged as a crucial channel for Chinese patients to access medical services, offering more convenient, high-quality, and personalized healthcare solutions [1]. These apps leverage the resource-sharing capabilities of the internet, complementing traditional medical models by addressing some of the needs of patients and physicians, optimizing outpatient processes, enhancing information management, and benefiting the follow-up of chronic diseases [2-4]. This development alleviates issues related to the difficulty of accessing medical services and high medical costs, thereby improving patient satisfaction.

The potential of mobile healthcare has been increasingly recognized across various sectors, leading to an annual expansion in the market scale of mobile healthcare. However, data collection during the study highlighted several inadequacies in the development of mobile medical apps. Many apps are not effectively utilized and fail to fundamentally address users' actual needs. Furthermore, concerns have been raised regarding the quality of advice and support provided by such health apps [5]. The resources

of doctors on these apps are underutilized, and due to communication channel limitations, issues such as untimely, inaccurate, and incomplete communication between patients and doctors persist. This prevents doctors from promptly obtaining effective information to diagnose conditions, and patients from receiving accurate diagnoses promptly, potentially delaying treatment.

Although academia has researched the inherent flaws and legal aspects of mobile medical apps, studies focusing on usage from the audience's perspective remain scarce. Therefore, this study adopts a user-centric approach, designing consultation cases for four common diseases and quantifying the evaluation criteria. It simulates the real consultation process of patients, evaluating 55 of the most downloaded medical apps in four categories of smartphone application markets in China based on the professionalism of medical consultation services and user experience. The study processes and analyzes the data, comparing scores to assess the diagnostic accuracy and professionalism of each app for each case, and averages the four scores for each app to form a comprehensive judgment.

In terms of user experience, the study evaluates the following indicators: presence of user satisfaction evaluations; price range of medical consultation services; average response time; presence of GPS location to match the user's locality, intelligent recommendations for doctors and hospitals; and synchronization with social software such as WeChat and QQ. Post-experiment data collection, the COVID-19 pandemic significantly increased the number of individuals seeking medical advice online, leading to the rapid development of mobile medical apps [6]. The results of this study demonstrate that the higher-scoring apps mentioned were more widely recognized during and after the pandemic, offering valuable reference suggestions for the public using mobile medical apps for healthcare. Through meticulous real-world experiments, rigorous data processing, and analysis, this study comprehensively evaluates the service quality of domestic medical apps from multiple channels and perspectives, validating the experimental results in real-world contexts. It aims to continue offering reference opinions for the development of mobile medical apps and provide more guidance and assistance to patients during usage.

2. Methodology

The 55 most downloaded medical apps were selected from the four most common app markets in China, namely iOS, Android, Huawei and Xiaomi: WeDoctor, Ping An Good Doctor, HaoDaFu, DingXiang Doctor, JianKang 160, ChunYu Doctor, 39 Health, Health Road, Thumb Doctor, Search Doctor and Medicine, Quick Doctor Inquiry, AliHealth, Gui Health, Kingsoft Doctor, LeLe Doctor, Seek Medical Treasure, Doctor Tree, Yi Health, Micro Consultation, U Health, Ai Kang, Famous Doctor Collection, Fun Hospital, DianDian Doctor, Help Doctor, Search Disease and Ask Doctor, KangKang Online, LeLian Health, Jiu Doctor, Appointment Registration Website, Jing Doctor Guard, Easy Diagnosis, XiaoHe Doctor Assistant, YiKang Home, Tang Shi, YiMai Tong, YiCheng Tong, Love Teeth, Micro Search, JianKe Online Pharmacy, YaoDu Headlines, Anti-Cancer Guardian, NanMi Health, ShenHuang Famous Doctor Hall, Mei Bei, Doctor Pocket, Healthy Nanjing, Sowing Pregnancy Community, HongHua Medical, HuaYi Tong, Bone Guardian, and SoYoung Beauty. The initial 15 of these applications were equipped with the functionality to facilitate online consultation and treatment services and thus were included in the study. Conversely, the remaining 40 applications, which lacked the aforementioned capabilities, were excluded from the study.

2.1. Evaluating criteria

Accuracy and Professionalism of Medical Consultation Services: Online Consultations. This study established consultation cases for four common diseases (lobar pneumonia, duodenal ulcer, intestinal obstruction, and appendicitis) and devised a quantitative scoring system based on four aspects: preliminary diagnosis, differential diagnosis, further examination, and treatment plan (Appendices 1-4) [7-10]. By simulating patient scenarios for online consultations, the author of this paper performed quantitative scoring based on the responses received through these online consultations.

User Experience:

• Presence of user satisfaction evaluations;

- Price range of medical consultation services and average response time;
- Availability of GPS location services to match users' locations with intelligent recommendations for doctors and hospitals;
- Synchronization with social software such as WeChat and QQ.

2.2. Results

Accuracy and Professionalism of Medical Services

This study simulated patients with intestinal obstruction and scored various medical apps as illustrated in Figure 1. The top three apps with the highest scores were AliHealth, HaoDaFu, and Quick Doctor Inquiry.
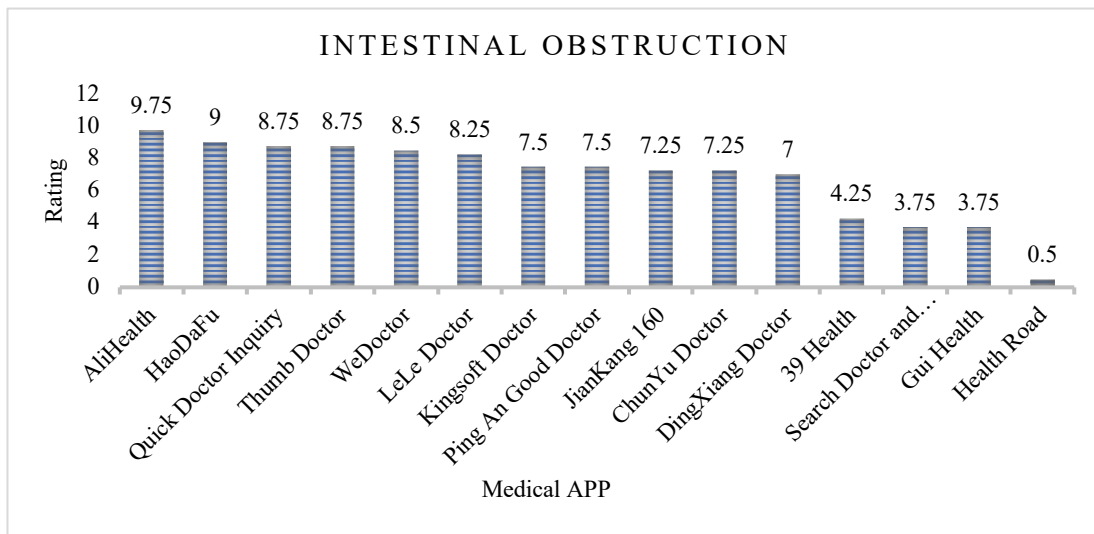

Figure 1. Intestinal Obstruction

This study also simulated patients with appendicitis and scored various medical apps as illustrated in Figure 2. The top three apps with the highest scores were DingXiang Doctor, JianKang 160, Thumb Doctore, and AliHealth.
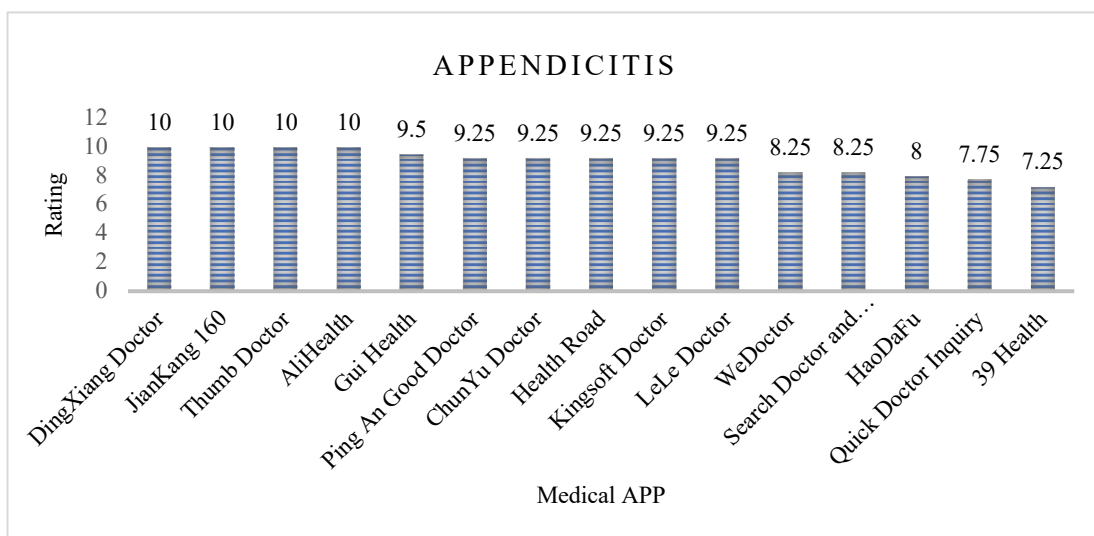

Figure 2. Appendicitis

This study simulated patients with Lobar pneumonia and scored various medical apps as illustrated in Figure 1-3. The top three apps with the highest scores were DingXiang Doctor, Thumb Doctor, and AliHealth.

The study simulated patients with Duodenal ulcers and scored various medical apps as illustrated in Figure 1-4. The top three apps with the highest scores were Search Doctor and Medicine, HaoDaFu, and Gui Health.
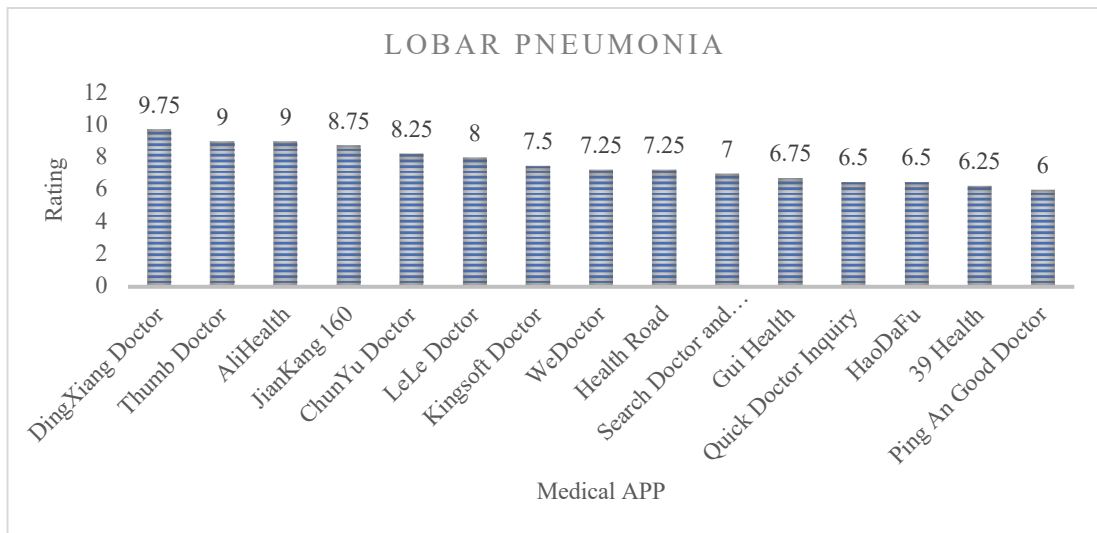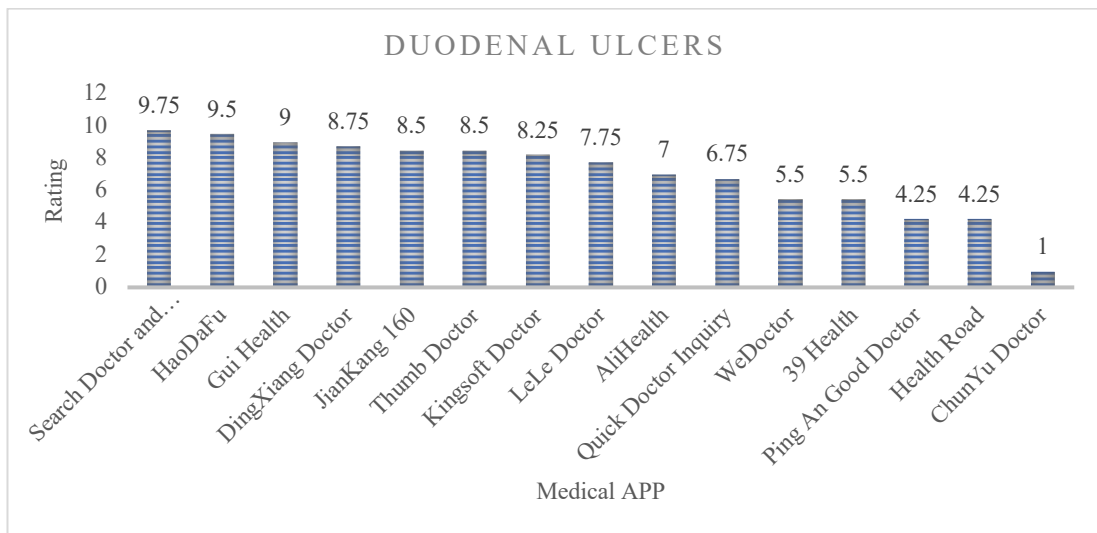

Figure 3. Lobar pneumonia

Figure 4. Duodenal ulcers

After the above scoreshad been averaged and combined, the scores of each medical app were shown in Figure 5. The top three apps with the highest scores were Thumb Doctor, AliHealth, and DingXiang Doctor.
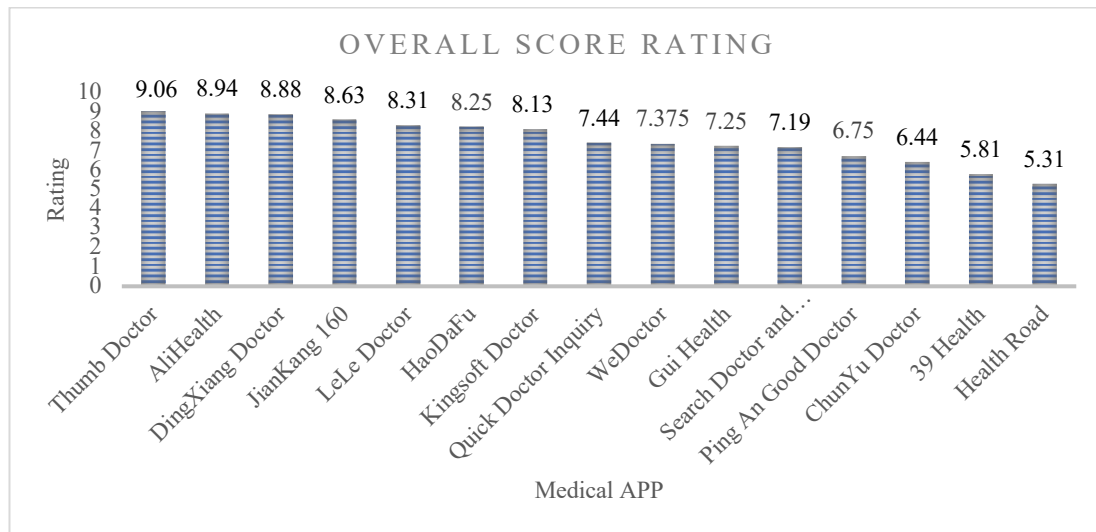
Figure 5. Overall Score

93.3% of medical APPs have user satisfaction evaluation; 34.8% reply to patients within 10 minutes during the consultation, and 86% of medical APPs with single cost less than 10 yuan. All software has a location function, and only 27% of them have intelligent recommendation functions. 7% of APPs have synchronicity with social software.

3. Discussion

This section talks about the future development of Mobile Healthcare Apps based on the experimental data. First, mobile healthcare apps should be improved in terms of its quality of diagnosis and treatment. Among mobile healthcare apps, 13.3% scored below 6 points in the comprehensive evaluation, while 6.7% scored above 9 points, indicating a gap between the diagnostic and treatment quality of healthcare apps in China and actual hospital visits. Approximately 34.8% of responses to inquiries were received in less than 10 minutes, suggesting a shortage of online physicians and prolonged waiting times for patients. Mobile healthcare apps are still immature; both the quantity and quality of online consulting physicians are insufficient, failing to guarantee continuous service availability for patients.

Second, Mobile healthcare Apps should standardize its management. Among 55 mobile healthcare apps, only 15 (27%) provide online consultation services. The variety of mobile healthcare app products results in varying quality standards. The construction of mobile healthcare apps in China is still in the exploratory stage. Patients have a keen interest in the future development prospects of mobile healthcare apps, which are expected to be extensively applied in hospitals and various levels of medical treatment facilities. This constitutes the driving force behind the development of healthcare apps. To standardize the use of mobile healthcare apps and better manage the market, the author suggests that government departments support their research and development and establish a comprehensive regulatory system to ensure the application of mobile healthcare apps in China is well-supported.

Last, deverloping some new functions for the benefits of patients in apps is necessary. The fees charged by various apps are significantly lower than the costs incurred from hospital visits, helping to alleviate China's current challenges of "difficulty in seeing a doctor" and high medical expenses. Patients commonly report low satisfaction with medical services due to their high costs. Diverse functionalities of mobile healthcare apps will be beneficial for patients and hospitals alike. The author proposes the following suggestions for enhancing mobile healthcare app functionalities. First, these apps should establish patient discussion features for sharing experiences, medical experiences, and disease recovery processes, including recommendations for renowned physicians. Second, developing cloud pharmacies for online prescription drug purchases enables orders to be placed from the comfort of their homes, with logistics provided by hospitals to patients' residences, which is especially beneficial for chronic patients

who require long-term medication. Three, mobile healthcare apps ought to be responsible for integrating health education by incorporating healthcare educational videos or textual materials into medical apps, thus promoting disease awareness and fostering healthy lifestyles. Fourth, mobile healthcare apps should introduce patient guidance functions such as medical triage, physician recommendations, and online retrieval of major hospital examination reports, thereby enhancing the overall patient healthcare experience.

4. Conclusion

In this study, a quantitative evaluation was conducted on 55 mobile healthcare apps, the most downloaded from four common application markets in China, focusing on the accuracy, professionalism of medical consultation services, and user experience. The following conclusions were drawn.From the perspective of accuracy and professionalism of medical consultation services, the top three apps with the highest average scores were Chunyu Doctor, Ali Health, and Dingxiang Doctor. Regarding user experience, 93.3% of healthcare apps had user satisfaction ratings. During the consultation process, 34.8% responded to patients within 10 minutes, and 86% of medical apps charged less than 10 yuan per consultation. All apps included location-based services, but only 27% featured intelligent recommendation functions. Additionally, 7% of apps exhibited synchronization with social media platforms.

However, this study also faces several limitations. Firstly, the data used in this experiment was collected in 2019, when mobile healthcare apps were still in their early stages of development. Secondly, the study design included only four common medical conditions with typical clinical symptoms, potentially overlooking more complex and misleading symptoms encountered in real-life scenarios. Moreover, the timely communication with physicians in this study did not require extensive preliminary examination data, such as CT scans, which may be necessary for confirming diagnoses after initial consultations in real-world scenarios.

As more hospitals embrace the Internet hospital model, future research could concentrate on the impact and influence of internet hospitals on mobile healthcare apps [11]. Furthermore, investigating whether the quantity and quality of consultations conducted by physicians through mobile healthcare apps affect their offline workload, working hours, and performance remains pertinent. Balancing and adjusting the relationship between online and offline healthcare services will be crucial. Currently, China's mobile healthcare app industry is experiencing rapid development. These apps alleviate burdens on hospitals, provide convenience to patients, and stimulate market circulation. Nevertheless, challenges such as incomplete regulatory frameworks and lax oversight persist due to the nascent stage of app development. Continuous innovation, addressing shortcomings, strengthening regulation, and enhancing the quality of online medical consultations are imperative for advancing the mobile healthcare app industry, thereby benefiting the populace.

This conclusion underscores the potential of mobile healthcare apps to revolutionize healthcare delivery in China, provided that ongoing improvements and regulatory enhancements are prioritized.

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