M-health Services Equipped with Public-Sector Community Health Centers in China: Investigating Adoption using UTAUT and Channel Expansion Theory

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Research article

Keywords: M-health, Technology Adoption, Health-care service delivery model, Government support, Channel expansion theory, UTAUT, Public-private joint venture.

DOI: https://doi.org/10.21203/rs.3.rs-109637/v1

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Abstract

Background: This study is to investigate the acceptance of a public-private joint venture, which is formed in-between public-sector community health centers (PCHC) and private-sector m-health service providers and can be a potential solution for two practical problems. The first problem is about PCHCs, which are operating about forty-one percent underutilization rates. The second problem is the lack of a revenue-generating business model for m-health service providers' while having a surprising number of registered users with daily health-care consultation queries. This joint venture will help to bridge the strengths of the public-sector health-care system (e.g., highly qualified doctors, offline health-care facilities) with the strengths of private-sector m-health service providers (e.g., a dramatic number of registered users, daily health-care consultation queries) resulting in a win-win situation for both parties.

Methods: The data collected from doctors associated with a territory hospital in Hefei, China, and analyzed using partial least squares, a structural equation modeling technique.

Results: This study extended the unified theory of acceptance and use of technology with the channel expansion theory. We explored that perceived media richness, government support, effort, and performance expectancies positively influence behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs. Surprisingly, social influence and facilitating conditions found insignificant in the Chinese context.

Conclusion: It can help the government healthcare authorities, and policymakers to build confidence in PCHCs, and to improve PCHC resource utilization. It can help m-health service providers to build confidence in m-health services resulting in a revenue-generating business model.

Introduction

In China, most of the people, even with a minor medical condition, also preferred to visit the emergency department (ED) of territory hospitals (TH) rather than visiting the primary health-care centers (PHC) [1, 2]. The reason behind this is the lack of trust in the competence of health-care professionals and the quality of delivered care in these PHCs [1]. The Chinese government had realized the associated criticalities, therefore, increased funding to strengthen primary health-care infrastructure and uplifted as community health center (CHC) in urban areas, while well-equipped small hospitals in rural areas [3, 4]. The local government in some cities of China started promoting to visit public sector CHC (PCHC) first, rather than visiting the ED of TH. Therefore, some of these local governments offered subsidized rates for dispensing drugs and a higher reimbursement rate for the delivered care in these PCHCs [4]. Surprisingly, the outpatient flow towards PCHCs was still in decline, as 63% in 2005 reached up-to 59% in 2013, which means that these PCHCs were operating about 41 percent underutilization rate [5]. There was a dire need to take such initiatives that can build trust in the quality of delivered health-care at PCHC, which results in increasing the outpatients' flow towards these PCHCs and ultimately lead to achieving optimal resource utilization in these PCHCs.
In China, m-health service adopters, either doctors or consumers, are significantly increasing. A Chinese m-health service provider, namely "Chunyu Yisheng," having a strength of about 0.41 million doctors, 92 million users, with more than 80,000 daily health-care consultations queries [6, 7]. Another Chinese online health-care platform, "Ping An Good Doctor," has about 77 million registered users, with about 0.25 million daily health-care consultation queries [8]. Surprisingly, similar forty-three online health-care service providers were operating in China [9]. These companies experienced that a tiny portion of these queries was generating revenues, as about 2.5% for "Chunyu" [7], and about 1% for "Hao Daifu Zaixian," a web-based online health-care service provider in China [10]. The reasons behind this were the prescription of medicines without physical check-up as a concern for doctors as well as m-health consumers, resulting in dissatisfaction, while the doctor was of the patients' own choice [11, 12]. There was a dire need to revisit the existing m-health service delivery model that can build confidence over m-health services resulting in a revenue-generating business model.

So, one such m-health service provider entered into a joint venture with a local government body in Wuhan China and introduced a dedicated section in the PCHC [6]. These PCHCs are capable of dealing with outpatients having minor medical conditions and referrals in case of an urgent medical condition. The consultation services will be provided by the doctors, who are associated with the top-level (e.g., territory) hospitals. These doctors will also train the staff of the concerned PCHC to uplift the quality of delivered health-care services [6]. Therefore, we considered those doctors as our targeted respondents, who were associated with a territory hospital. In this joint venture, an m-health consumer makes an appointment with the concerned doctor using m-health APP, and then to get an offline health-care consultation in the PCHC as per scheduled time [6]. All those m-health users who can be treated online can get an online health-care consultation, while those needing a physical examination before prescribing medication can be examined in the PCHCs. Zhang et al. [10] argued that offline healthcare satisfaction could hinder online healthcare awareness and adoption. M-health services that are equipped with PCHCs will provide an offline health-care consultation facility. As a result, the doctors will not feel reluctant to prescribe treatment. We posit that equipping m-health services with PCHCs can help the doctors to prescribe treatment with confidence. As a result, doctors and m-health users can experience satisfactory health-care consultation services. One such m-health service provider planned to establish similar three-hundred health-care facilities in China [7]. M-health services that are equipped with PCHCs will help to bridge the strengths of both parties, resulting in a win-win situation for private sector m-health service providers and PCHCs.

Private sector m-health services that are equipped with PCHCs is a newly emerging mobile-based healthcare service delivery model, which is not mature enough, and not investigated earlier. In addition, a unifying policy to govern the Chinese m-health industry does not exist [13] as some of the local governments are supporting to use m-health services [6] while the legislation can also be seen that banned appointment making with the doctors of public hospitals using m-health applications [13]. In this scenario, it is of great importance to examine the doctors' behavioral intent to prescribe treatment using m-health services that are equipped with PCHCs, which is a public-private joint venture. So, the objective
of this study is to investigate essential factors which influence the doctors' behavioral intent to prescribe treatment using this emerging mobile-based healthcare service delivery model in China.

**Contribution**

To the best of our knowledge, this study is the first to examine factors essential in the adoption of such a public-private joint venture that is formed between the public sector community health centers and the private sector m-health service providers. This study explored that m-health service providers can facilitate to divert the outpatients' flow towards community health centers. This facilitation will help to achieve optimal resource utilization in these community health centers. The outpatients referred to those who are with minor medical conditions and can be treated online and in the community health centers. This study explored that m-health users can get an offline health-care consultation facility in community health centers. This offline health-care consultation facility will help to build confidence over m-health service providers and ultimately lead towards a revenue-generating business model for m-health service providers. This study investigated the adoption of such a public-private joint venture that can provide online as well as offline health-care consultation to m-health consumers. This will be the first study that employed channel expansion theory to investigate m-health adoption. This will be the first study that extended UTAUT theory with the channel expansion theory constructs to investigate m-health adoption. This will be the first study that employed perceived government support and media richness to investigate m-health adoption.

**Theoretical Model And Hypothesis Development**

The adoption of e-health and m-health services have been investigated using various theoretical approached including stimulus-organism-response theory [14], protection motivation theory [15], the theory of planned behavior, and value attitude behavioral model [16], trust transfer model [17], technology acceptance model [18–26], and the unified theory of acceptance and use of technology theory [27–34]. The unified theory of acceptance and use of technology (UTAUT) argues that the effort and performance expectancies with social influences and facilitating conditions having a direct effect on the behavioral intention to use new technology. This behavioral intention ultimately affects the usage behavior, while the facilitating conditions have a direct impact as well on the usage behavior [35, 36]. The UTAUT theory is based on a comprehensive examination of several theories, including the theory of reasoned action, the theory of planned behavior, social cognitive theory, and the technology acceptance model [27, 35]. Therefore, UTAUT theory is widely adopted in several technological domains like e-health [37], mobile electronic medical record systems [30], and became a reason to employ in this study. The channel expansion theory posits that the consumers' (e.g., doctors) relevant experiences with a technology-based communication channel (e.g., traditional m-health application) will help to shape their perception about its media richness [38]. M-health services that are equipped with PCHCs will be the extension of the traditional m-health application-based service delivery model. Therefore, we employed the channel expansion theory in this study. The channel expansion theory comprises the perceived media richness, social influence, and situational factors [39]. This study is investigating the adoption of a public-private joint venture in China, and a unifying policy to govern the Chinese m-health industry does not exist [13].
For instance, some of the local governments are supporting to use m-health services [6], while the legislations can also be seen that banned appointment making with a doctor of public hospitals using m-health applications [13]. On the other side, the public sector community health centers having significant governmental support [3, 4]. Therefore, perceived government support got employed as a situational factor. So, this study employed effort expectancy (EE), performance expectancy (PE), social influence (SN), facilitating conditions (FC), and behavioral intention to use (BI) from UTAUT theory. While perceived media richness (PMR), perceived government support (PGS), and social influence (SN) from channel expansion theory. Figure 1 demonstrates the research model.

Perceived Media Richness

M-health services that are equipped with PCHCs will provide a technology-based health-care service delivery model; therefore, the doctors' perception regarding media richness is of great importance. In this study, PMR is the doctors' belief that m-health services equipped with PCHCs will provide a satisfactory communication interface to meet their disease diagnosis needs that will result in the prescription of medication. The media richness can be referred to have better communication amenities (i.e., video conversation) to influence performance than those having limited communication amenities (i.e., audio phone call) [40]. The relationship in-between PMR and usage intention has been studied in various technological domains such as the virtual learning environment [41], and instant messaging [42]. Therefore, we propose:

**H1: PMR positively affects behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs.**

Situational Factor: Perceived Government Support

The local governmental support can be an influential factor in m-government adoption [43], and the information technology diffusion process [44, 45]. In this study, PGS is the doctors' belief that the government will be devoted to putting m-health services that are equipped with PCHCs into practice. Tashkandi et al. [46] considered the governmental regulations as an environmental factor which can influence to adopt cloud computing. The relationship in-between government support and the intention to adopt has been investigated in various technological domains such as m-government among rural farmers [43], open government data [47], and mobile-based outpatient health-care service delivery framework [48, 49]. Therefore, we propose:

**H2: PGS positively affects behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs.**

Social Influence

The social influence is "the degree to which an individual perceives that important others believe he or she should use the new system [35]." In this study, these important others referred to as office colleagues and administration. The relationship in-between SN and behavioral intention have been studied well in various technological domains such as mobile-based payment adoption [50], medical diagnosis support system
based on artificial intelligence [36], mobile health [27], mobile payments [51, 52], virtual learning environments [53], and electronic commerce [54]. Therefore, we propose:

**H3: SN positively affects behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs.**

**Effort Expectancy**

The EE is "the degree of ease associated with the use of the system [35]." In this study, EE is the doctors' belief that it will be easy for them to diagnose a disease and prescribe medication using m-health services that are equipped with PCHCs. We posit that such a belief will help to build confidence for doctors to prescribe treatment. The relationship between EE and intention to use has been investigated in various technological domains like mobile banking [55], electronic government [56], mobile payments [51, 52], virtual learning environments [53], and electronic commerce [54]. Therefore, we propose:

**H4: EE positively affects behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs.**

**Performance Expectancy**

PE is "the degree to which a person believes that using the system will enhance his or her job performance [35]." In this study, PE is the doctors' belief that m-health services that are equipped with PCHCs will help to improve their disease diagnosis level and to reduce the chances of medical negligence. We posit that PE will help to build confidence for doctors to deliver a satisfactory health-care consultation using m-health services that are equipped with PCHCs. The relationship between PE and intention to use has been investigated in various technological domains like electronic government [56], mobile payments [51, 52], virtual learning environments [53], and electronic commerce [54]. So, we propose:

**H5: PE positively affects behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs.**

**Facilitating Conditions**

The FC is "the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system [35]." Xie et al. [9] explored that about twenty online hospitals in China could deal with online and offline health-care consultations. The online health-care service industry in China is capable of dealing with outpatients [1, 57]. In this study, FC is the doctors' belief that m-health services that are equipped with PCHCs can provide the necessary technological infrastructure for health-care consultation. The relationship between FC and intention to use has been investigated in various technological domains like electronic government [56], and electronic commerce [54]. Therefore, we propose:

**H6: FC positively affects behavioral intention to deliver health-care consultation using m-health services that are equipped with PCHCs.**
Materials And Methods

Research Setting
The targeted respondents were the doctors serving in a TH located in the city of Hefei, Anhui Province, China. An approval to conduct this study got obtained from the concerned departments. All of the questionnaires got equipped with a news article regarding the inaugural of first such facility [6]. An additional information sheet was also provided, having a detailed description of health-care consultation using this healthcare service delivery model, and the respondent rights. The questionnaires got shared with doctors in a face-to-face conversation and collected back after few days according to their convenience.

Measurement
One of the authors remained engaged in conducting a qualitative study that investigated m-health business and service delivery model of a Chinese company [12]. The mentioned qualitative study, as well as a news article regarding the inaugural of first such facility [6], provided us ground to conduct this study. The mentioned qualitative study and the literature review helped us to choose the constructs used in the current study. All of the constructs were adapted from existing literature with necessary changes to meet the specific research context and measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The measures for EE, PE, SN, FC, and BI adapted from Venkatesh et al. [35] The measures for PGS adapted from Goh, Tan, and Teo [44, 45]. The measures for PMR adapted from Chen et al. [58]. Appendix "A“ describes the survey questionnaire items.

Questionnaire Design and Data Collection
A structured questionnaire got designed consisting of two parts, including demographic information and the concerned constructs. The questionnaire was first developed in the English language and checked by the native English speaker, a doctor by profession, and well familiar with m-health services. Later, a native Chinese speaker, fluent in English, researching health-care informatics, translated the questionnaire from English to Chinese. At then, the validity of the questionnaire items and content was assessed by sharing the questionnaire with 3 Ph.D. research scholars and 8 Master’s degree students researching in the field of health-care operations management, health-care service operations, and health-care informatics. After accommodating their recommendations, a pilot study got conducted, in which four doctors from a TH got requested to participate. These participants were familiar with m-health services, and their answers to the questionnaire included feedback that used to refine the measurement items. The modified questionnaires distributed among 292 doctors. Out of which 268 were considered valid after excluding the incomplete and wrongly filled questionnaire. Non-response bias was checked by comparing the responses from the questionnaire completed earlier with those that were completed later. A significant difference did not found between the two groups; therefore, the non-response bias is not a concern in our sample set. Table 1 got equipped with the demographic characteristics of the respondents.

Table-1: Demographic information
### Table 1: Descriptive Statistics

| Descriptions                  | Frequency | Percentage |
|-------------------------------|-----------|------------|
| **Gender**                    |           |            |
| Male                          | 143       | 53.4       |
| Female                        | 125       | 46.6       |
| **Age (years)**               |           |            |
| ≤ 30                          | 98        | 36.6       |
| 31 – 40                       | 131       | 48.8       |
| 41 – 50                       | 39        | 14.6       |
| ≥ 51                          | 0         | 0          |
| **Work Experience (years)**   |           |            |
| ≤ 5                           | 107       | 39.9       |
| 6 – 10                        | 116       | 43.3       |
| 11 – 15                       | 45        | 16.8       |
| ≥ 16                          | 0         | 0          |
| **Experience:**               |           |            |
| Using Computers (years)       |           |            |
| ≤ 1                           | 0         | 0          |
| 2 – 3                         | 0         | 0          |
| 4 – 6                         | 0         | 0          |
| ≥ 7                           | 268       | 100        |
| **Experience: Using Smartphone (years)** | | |
| Android/ iOS based phones     |           |            |
| ≤ 1                           | 0         | 0          |
| 2 – 3                         | 0         | 0          |
| 4 – 6                         | 192       | 71.6       |
| ≥ 7                           | 76        | 28.4       |

### Data Analysis

The common method of bias testing performed using SPSS (v.20). Later, Smart-PLS (v.3.2.7) used for the partial least squares estimations. This is a structural equation modeling technique and can combine the principal components analysis and regression resulting in estimating the measurement along with structural model concurrently [59].

### Results

#### Common Method Bias

The common method bias is considered a threat to validate the research results, in case the data against all measurements collected from the same individual at the same point of time [60]. The common method bias is not an issue as the first factor demonstrates 27% of the variance significantly less than the acceptable value (50%) [61].

#### Measurement Model

It is necessary to examine the reliability and validity of the measures before testing the hypothesis [62]. The measurement model got assessed using the convergent and discriminant validities. The value of Cronbach's alpha, and the composite reliability higher than 0.70, while the AVE and factor loadings higher than 0.50 indicate good construct reliability, and evidence of good convergent validity [59, 63–65]. Table 2 demonstrates that the values for Cronbach’s alpha/ composite reliability/ AVE are between 0.700
and 0.831/ 0.822 and 0.899/ 0.544 and 0.747 respectively. Table 3 demonstrates that the loadings of all items are greater than the minimum acceptable level. Hence, the results point toward high-quality convergent validity.

### Table-2: Results of the Measurement Model

| Convergent Validity          | Discriminant Validity |   |
|-----------------------------|-----------------------|---|
| Cronbach's Alpha CR AVE    | EE FC BI PE PGS PMR SN |
| EE 0.777 0.857 0.600       | 0.775                 |   |
| FC 0.700 0.822 0.609       | 0.071 0.780           |   |
| BI 0.831 0.899 0.747       | 0.474 0.109 0.864     |   |
| PE 0.720 0.825 0.544       | 0.367 -0.014 0.455 0.737 |   |
| PGS 0.811 0.888 0.726      | 0.412 0.036 0.593 0.399 0.852 |   |
| PMR 0.779 0.872 0.695      | 0.423 0.014 0.526 0.471 0.534 0.834 |   |
| SN 0.740 0.834 0.628       | 0.049 0.032 0.100 0.016 0.055 -0.018 0.793 |   |

**CR** Composite Reliability; **AVE** Average Variance Extracted; **EE** Effort Expectancy; **FC** Facilitating Conditions; **BI** Behavioral Intention; **PE** Performance Expectancy; **PGS** Perceived Government Support; **PMR** Perceived Media Richness; **SN** Social Influences

### Table-3: Item Cross Loadings
The discriminant validity helps to determine the measurements for each construct are dissimilar from others [66]. We adopted two approaches to examine discriminant validity [67]. 1) The discriminant validity considers satisfactory in case the square roots of the AVE are higher than the correlation with other constructs [68]. So, table 2 is evidence of good discriminant validity. 2) We inspected the item loading and cross-loading in table 3. The item loadings of corresponding constructs were significantly higher than the cross-loadings of other latent variables, which also represents good discriminant validity. The variance inflation factor (VIF) values should be lower than 10 [69]. Otherwise, the tolerance values should be greater than 0.1, and then the multicollinearity is not a concern. In this study, the VIF values are ranging from 1.282 to 2.029, so multicollinearity is not a concern.

The hypothesis testing performed by applying the bootstrapping method. The results indicate that PMR (β =
0.187, \(t = 2.679\), PGS (\(\beta = 0.347, t = 5.190\)), EE (\(\beta = 0.184, t = 3.177\)), and PE (\(\beta = 0.161, t = 2.918\)) has a positive effect on behavioral intention to deliver healthcare consultation using m-health services that are equipped with PCHCs. Therefore, H1, H2, H4, and H5 are supported. The SN (\(\beta = 0.070, t = 1.121\)) and FC (\(\beta = 0.081, t = 1.423\)) do not find having any positive effect on behavioral intention to deliver healthcare consultation using m-health services that are equipped with PCHCs. Therefore, H3 and H6 got rejected.

Our model explains 48% of the variance (\(R^2 = 0.48\)) in the behavioral intention to deliver healthcare consultation using m-health services that are equipped with PCHCs. So, it is concluded that the hypothesized model is acceptable. Table 4 demonstrates the research results.

### Table 4: Results of the Research Model:

| Hypothesis | Relationship | t-statistics | P Values | Comments |
|------------|--------------|--------------|----------|----------|
| H1         | PMR -> BI    | 0.187        | 2.679    | 0.007    | Accepted |
| H2         | PGS -> BI    | 0.347        | 5.190    | 0.000    | Accepted |
| H3         | SN -> BI     | 0.070        | 1.121    | 0.262    | Rejected |
| H4         | EE -> BI     | 0.184        | 3.177    | 0.001    | Accepted |
| H5         | PE -> BI     | 0.161        | 2.918    | 0.004    | Accepted |
| H6         | FC -> BI     | 0.081        | 1.423    | 0.155    | Rejected |

\(R^2\) (Behavioral Intention to Use) = 0.480 = 48%

PMR Perceived Media Richness; BI Behavioral Intention; PGS Perceived Government Support; SN Social Influences; EE Effort Expectancy; PE Performance Expectancy; FC Facilitating Conditions

### Discussion And Conclusion

This study is of great importance due to several reasons. 1) It is investigating essential factors in the adoption of a joint venture in-between private sector m-health service provider and public sector community health centers. Which is a newly establishing health-care service delivery model, and not mature enough. 2) This joint venture can be a potential solution for two practical problems while associated with PCHCs and private sector m-health service providers. 3) This joint venture will help to bridge the strengths of the public sector health-care system with the strengths of private sector m-health service providers. The public sector health-care system strengths were offline health-care facilities, with highly qualified doctors and associated staff. The private sector m-health service provider strengths were a dramatic number of consumers and daily health-care consultation queries. In such a way, public sector strengths will help to build trust in private sector m-health services. In contrast, private sector strengths will help to divert the outpatients (e.g., m-health consumers with minor medical conditions) flow towards PCHCs that will lead to elevate the PCHCs resource utilization. So, a win-win situation can be expected for both parties.
This study employed UTAUT with the channel expansion theory and concluded with several interesting findings that support our argument to employ these two theories concurrently. This study is investigating a public-private joint venture; therefore, perceived government support is of great importance. Perceived government support as a situational factor in the channel expansion theory found the most significant influencing factor in this study. Effort expectancy and the performance expectancy of UTAUT theory found the second and third most significant influencing factors in this study. Perceived media richness of channel expansion theory found the fourth most significant influencing factor in this study. Facilitating conditions of UTAUT theory did not found to have any considerable influence in the acceptance of m-health services that are equipped with PCHCs in the Chinese context. Subjective norms is an essential factor of both theories (e.g., the UTAUT and channel expansion theory), but not found as an essential factor in the acceptance of m-health services that are equipped with PCHCs in the Chinese context.

It can be concluded that a unifying policy to govern the Chinese m-health market is of great importance, and the Chinese government is well aware of the potential of the Chinese m-health service market; therefore, it can be expected sooner [13]. We further conclude that m-health service providers need to strengthen the communication medium such as online health-care consultation with video conferencing facility, and a more user-friendly interface. A survey got conducted in 23 countries, and about 18,180 individuals got interviewed. The survey revealed that worldwide about 12% of people reported using a connected health device currently, and another 12% reported using such devices formerly [70]. In China, about 28% of the respondents replied that they were using a connected health device currently, and the Chinese found the most likely to use such health devices [70]. This might be the reason behind that facilitating conditions, and subjective norms are no more essential factors in the Chinese context for m-health adoption.

Implications

For theoretical implications, 1) this is the first study to empirically investigate the acceptance of a joint venture in-between private sector m-health service providers and public sector community health centers. 2) The first study to employ UTAUT and the channel expansion theory concurrently to investigate the acceptance of m-health services. 3) The first study to employ and to investigate the perceived government support as a situational factor in the acceptance of m-health services. 4) The first study to argue that m-health service providers can play a significant role in elevating PCHC resource utilization. 5) The first study to argue that m-health users can be treated online and offline as well.

For practical implications, 1) this study will help the governmental health-care authorities in policymaking to build confidence in the health-care consultation at PCHCs. 2) This study will help the government authorities to uplift the quality of delivered health-care at PCHCs. 3) This study will help the government health-care authorities to elevate PCHC resource utilization. With time, it will start influencing to mitigate ED overcrowding from THs. 4) This study will help to build trust in health-care consultation using m-health services results in a revenue-generating business model for m-health service providers.

Limitation and Future Research
This study has a few limitations. The doctors considered as targeted respondents. In the future, m-health consumers, and doctors associated with PCHCs can also be considered. This study conducted in Hefei, Anhui, China. In the future, the study can be conducted in various other metropolitan cities of China.

**Declarations**

**Acknowledgments**

We are thankful to Miss Stella Wang from the School of Management, University of Science and Technology of China, for helping us to get approval to collect data. We are thankful to the administration of the First Affiliated Hospital of Anhui Medical University for allowing us to collect data. We are grateful to Dr. Mamoon Rasheed, a nephrologist from Kidney Specialists of Central Oklahoma, United States of America. Without his professional knowledge and inspiring discussion, this paper would not be possible to complete.

**Funding Statement**

This research was partially supported by the Key R&D Plan of Anhui Province 2020, and Population Health Special Project. Project number: (202004j07020046).

**Ethical Approval**

A written letter to conduct this study and to collect data obtained from the School of Management, University of Science and Technology of China, Hefei, China. In pursuance of this letter, verbal approval was granted by the hospital administration.

**Conflicts of Interest**

The authors declare that they have no competing/conflicts of interest.

**Authors Contribution**

All authors have an equal contribution.

**Data Availability**

This research is part of a series of research studies conducted by a group of researchers. Therefore, the data can be shared after 24 months of publication of this article with mutual consultation of related group members and researchers.

**Consent for Publishing**

The authors agree to publish this research work.

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Appendix A

Appendix A: Survey questionnaire items
| Constructs and Items | Measures |
|---------------------|----------|
| **Effort Expectancy (EE)** | **Source: Venkatesh et al. [35]** |
| EE1 | The prescription of medicines using [m-health services that are equipped with PCHCs] will be easy for me. |
| EE2 | I can easily become skillful at using [m-health services that are equipped with PCHCs] for health-care consultation. |
| EE3 | I think that the disease diagnosis process of m-health consumers (e.g., outpatients with minor medical conditions) will be clear and understandable using [m-health services that are equipped with PCHCs]. |
| EE4 | Learning to use [m-health services that are equipped with PCHCs] for health-care consultation will be easy for me. |
| **Performance Expectancy (PE)** | **Source: Venkatesh et al. [35]** |
| PE1 | [M-health services that are equipped with PCHCs] will be useful for me, as giving an opportunity to physically examine the m-health consumers (e.g., outpatients with a minor medical condition). |
| PE2 | [M-health services that are equipped with PCHCs] will help to improve my disease diagnosis level. |
| PE3 | [M-health services that are equipped with PCHCs] will help to release the pressure that is associated with an online prescription of medicines. |
| PE4 | [M-health services that are equipped with PCHCs] will help to reduce the chances of medical negligence. |
| **Social Influence (SN)** | **Source: Venkatesh et al. [35]** |
| SN1 | I think my colleague (e.g., doctors) will be willing to use [m-health services that are equipped with PCHCs] for health-care consultation. |
| SN2 | I think my colleague (e.g., doctors) would want me to use [m-health services that are equipped with PCHCs] for health-care consultation. |
| SN3 | I think the administration will support me to use [m-health services that are equipped with PCHCs]. |
| **Facilitating Conditions (FC)** | **Source: Venkatesh et al. [35]** |
| FC1 | I have the resource necessary to use [m-health services that are equipped with PCHCs]. |
| FC2 | I have the knowledge necessary to use [m-health services that are equipped with PCHCs] for health-care consultation. |
| FC3 | I think the technical staff of m-health service companies will be available for assistance with system difficulties. |
| **Perceived Government Support (PGS)** | **Source: Goh, Tan, and Teo [44, 45]** |
| PGS1 | I think that the government will endorse [m-health services that are equipped with PCHCs] in the country. |
| PGS2 | I think that the government is active in setting up the facilities to enable [m-health services that are equipped with PCHCs]. |
| PGS3 | I think that the government will promote the use of [m-health services that are equipped with PCHCs] for primary health-care consultation. |
| **Perceived Media Richness (PMR)** | **Source: Chen et al. [58]** |
| PMR1 | It will be easy for me to provide health-care consultation using [m-health services that are equipped with PCHCs]. |
| PMR2 | I think the communication conditions/ interface of [m-health services that are equipped with PCHCs] can help me to provide health-care consultation quickly. |
| PMR3 | I think the communication conditions/ interface of [m-health services that are equipped with PCHCs] can help me to diagnose a disease in an efficient way. |
| **Behavioral Intention** | **Source: Venkatesh et al. [35]** |
to Use (BI)
BI1 I will like to use [m-health services that are equipped with PCHCs] if I have an opportunity.
BI2 I will like to use [m-health services that are equipped with PCHCs] as much as possible if I have an opportunity.
BI3 I make sure; I will deliver health-care consultation services using [m-health services that are equipped with PCHCs] if I have an opportunity.