

# Knowledge, attitudes, and practices related to the establishment of the National Hierarchical Medical System (NHMS) among outpatients in Chinese tertiary hospitals

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## Abstract

This study sought to assess the status of, and factors associated with, knowledge, attitudes, and practices (KAP) related to the establishment of the National Hierarchical Medical System (NHMS) among outpatients receiving care in tertiary hospitals in China.

A cross-sectional study surveying tertiary outpatients was conducted. This study investigated KAP concerning the establishment of the NHMS among outpatients from tertiary hospitals, who could have sought medical care from a general practitioner in surrounding primary care medical institutions. Several factors associated with outpatients' knowledge were identified and included in fully adjusted analyses using logistic regression.

Survey questionnaires were completed by 565 outpatients in 4 tertiary hospitals. Approximately half (51.86%) of the sample was aware of the NHMS. In multivariable analysis sex, age, education level, and place of residence were associated ( $P < .05$ ) with knowledge of NHMS. Overall 74.69% of respondents expressed positive attitudes toward the establishment of the NHMS. However, a much lower proportion, 21.95%, was willing to choose nearby grassroots sub-unit hospitals as their first choice when seeking health care.

The present study revealed outpatients in China may lack knowledge of the NHMS, yet most have a positive attitude toward the establishment of the NHMS. Even so, there was hesitation in terms of seeking care from the NHMS, indicating the need for policy makers to take action to increase public awareness surrounding NHMS-related information to improve the public's KAP on the establishment of the NHMS. This study highlights information useful for policy makers in China and other countries planning or evaluating related policies.

**Abbreviations:** KAP = knowledge, attitudes, and practices, NHMS = National Hierarchical Medical System.

**Keywords:** attitudes, influencing factors, knowledge, National Hierarchical Medical System, practices

## 1. Introduction

Primary care medical institutions commonly referred to as grassroots medical institutions play an extremely important role in the National Medical and Health Care System (NMHCS) in China, with many Chinese officials and policy makers supporting the implementation of “community-based medical institutions

first” to develop and enhance the service capacity of these primary care medical institutions. However, the development of these primary care medical institutions, namely sub-unit hospitals, is severely limited.<sup>[1–3]</sup> The “inverted triangle” of health resource allocation in China has been the usual course of medical care seeking behavior. This then leads to the consumption of unnecessary health care resources at larger tertiary facilities, that could have been diverted to primary care settings (e.g., for routine care) thereby enhancing the rapid development of tertiary hospitals.<sup>[2,3]</sup> This has led to overwhelming work stress for medical personnel in larger tertiary hospitals. Thus, issues related to job satisfaction, burnout, and turnover among Chinese physicians have become more prevalent.<sup>[4–6]</sup> At the same time, patients often have unfavorable experiences in seeking medical treatment, given they have to queue up (wait in line), consuming potentially unnecessary time waiting for treatment.<sup>[7–9]</sup> Thus, the NMHCS of China is currently positioned to react to many stakeholders that are not satisfied.<sup>[1–10]</sup> Ultimately, patients' dissatisfaction has become a pressing problem that cannot be neglected in China.<sup>[10]</sup> Given the medical costs in large tertiary hospitals are significantly more expensive than in primary care settings, there is an opportunity to lower spending as well.

To resolve this problem, the Chinese government is now pushing ahead with the implementation of the National Hierarchical Medical System (NHMS), and has launched many relevant policies including the national general practitioner system and 2-way referral system. The NHMS aims to reallocate

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health care resources, and to give primary care medical settings (grassroots medical institutions) more support, including financial support and human resources. The NHMS argues that the tertiary hospitals need to cooperate with grassroots medical institutions through a 2-way referral system. A 2-way referral system asks patients to choose a general practitioner in primary care medical institutions as their first-contact doctor, with transfer to a tertiary hospital for further treatment, as needed. Concurrently, inpatients in tertiary hospitals would be transferred to primary care medical institutions including sub-unit hospitals. In this way, the NHMS can improve accessibility to medical services for treatment and maximize the efficiency of medical resource utilization.<sup>[11–13]</sup>

However, the implementation of the NHMS is likely to be hindered if the Chinese government pushes to establish it without buy-in from the public or other key stakeholders. Therefore, relevant policymakers should identify current stakeholders' (e.g., the general public who serve as the potential patient population) knowledge, attitudes, and practices (KAP) of the NHMS in order for the most effective implementation of this policy, which may be better facilitated with key stakeholder buy-in. If the general public lacks sufficient knowledge surrounding the ultimate goals and potential benefits of the NHMS they may be less willing to welcome such a dramatic change. Therefore, we conducted a cross-sectional survey aimed at investigating KAP concerning the establishment of the NHMS among outpatients from 4 provincial tertiary hospitals in China. This population was of particular interest as those seeking more routine care may be best served seeking care from a general practitioner in sub-unit hospitals rather than seeking more advanced and potentially unnecessary care that is more costly from a specialist physician in a larger tertiary comprehensive hospital.

In this paper, we assessed the status of, and factors associated with, KAP related to the establishment of the NHMS among outpatients in the most advanced provincial tertiary hospitals Jiangxi Province, China. We sought to obtain baseline information that may inform policy makers in China. Similar assessments may be of use in other countries and as such, the current study may play a role in informing policy makers in other similar countries as well.

## 2. Materials and methods

### 2.1. Inclusion criteria of the participants

In the current study, we surveyed patients in 4 tertiary hospitals in China's Jiangxi Province. We used trained research staff to assess whether individuals met the following inclusion criteria: were outpatients; and who were not transferred from another facility. Research staff asked whether the patients had made an appointment with an outpatient provider. Those answering "yes" to being an outpatient were asked if they were transferred from another health care institution or hospital. Those who answered that they were transferred from another facility were excluded. Thus, we included those receiving care from a provider for outpatient services and who were not transferred from another facility in order to target those most likely to be seeking routine medical care – those most likely to be candidates of receiving routine care from general practitioners in a primary care setting once the NHMS is fully enacted.

### 2.2. Sampling methods

A cross-sectional survey was employed in the present study. We conducted the survey at 4 provincial tertiary hospitals in Jiangxi

Province that were selected by a purposive sampling method. These hospitals are the largest comprehensive hospitals with more than 12,175 beds in total.<sup>[14]</sup> A spatial sampling strategy was used to select the targeted individuals at different directions (e.g., north, south) of outpatient departments and on different floors of the outpatient buildings. The last step was to carry out the investigation by means of an accidental sampling approach. We completed 150 questionnaires in each hospital.

### 2.3. Data collection

The questionnaires were completed by asking outpatients about their demographic information and KAP related to the establishment of the NHMS. Demographics and social-economic variables such as sex, age group, educational level, average monthly income, place of residence, type of health care insurance, and physical health status were assessed. Outpatients' KAP related to the establishment of the NHMS were measured across the following: if they knew about the NHMS, "*Do you know what the NHMS is? (yes/no);*" whether or not the NHMS may help make improvements with access to health care services and help lower the costs of health care services, "*Do you think the NHMS can relieve poor access and high fees associated with health care services? (yes/no);*" and their willingness to choose a general practitioner in the nearby grassroots sub-unit hospitals as the first-contact doctor under the NHMS, "*Will you choose a general practitioner in the nearby grassroots sub-unit hospitals as your first-contact doctor under the NHMS? (yes/no).*" We defined self-reported responses as "yes" or "no." Research staff explained the NHMS in detail (consistently across all respondents) to those outpatients who had little knowledge, in order to let respondents provide an informed perspective on the remaining survey questions.

In order to protect privacy, outpatients who satisfied the inclusion criteria were asked to complete the questionnaires independently and anonymously. Those who could not read or who required assistance were interviewed by trained research staff from Nanchang University, Tongji Medical College of Huazhong University of Science and Technology, and Wuhan University by means of face-to-face interviews. Surveys were collected between late September and early October of 2016.

### 2.4. Data analysis

In this paper, we employed the Statistical Package for the Social Sciences (SPSS) version 22.0 for Windows (SPSS Inc., Chicago, IL) to run all statistical analysis with a  $P$ -value  $< .05$  indicating significant differences. Descriptive analysis summarizing respondents' demographic information with frequencies and proportions were reported in Table 1. Respondents' KAP on establishment of the NHMS were presented with frequencies and proportions in Table 2. Binary logistic regression analysis was performed to identify the main socio-demographic factors associated with outpatients' knowledge of the establishment of the NHMS. The crude odds ratios (COR) value from bivariate logistic regression and adjusted odds ratios (AOR) from multivariable logistic regression were reported in Table 3. In addition, 95% confidence intervals (95% CI) and associated  $P$ -values were also presented. The strength and direction of the relationship among respondents' KAP related to the establishment of the NHMS were examined by Spearman Rank Correlation Coefficient, as presented in Table 4.

**Table 1****Demographic information of the survey participants (n=565).**

| Demographics                   | Frequency | Percentage, % |
|--------------------------------|-----------|---------------|
| Sex                            |           |               |
| Male                           | 307       | 54.34         |
| Female                         | 258       | 45.66         |
| Age                            |           |               |
| ≤25                            | 83        | 14.69         |
| 26–45                          | 187       | 33.10         |
| 46–65                          | 196       | 34.69         |
| >65                            | 99        | 17.52         |
| Education level                |           |               |
| ≤Junior high school            | 397       | 70.27         |
| Bachelor's degree              | 102       | 18.05         |
| ≥ Master's degree              | 66        | 11.68         |
| AMI* (CNY)                     |           |               |
| <3000                          | 181       | 32.04         |
| 3000–4999                      | 199       | 35.22         |
| 5000–6999                      | 106       | 18.76         |
| ≥7000                          | 79        | 13.98         |
| Place of residence             |           |               |
| City                           | 329       | 58.23         |
| Countryside                    | 236       | 41.77         |
| Types of health care insurance |           |               |
| No insurance                   | 67        | 11.86         |
| Yes, NRCMS*                    | 303       | 53.63         |
| Yes, MISUR*                    | 195       | 34.51         |
| Physical condition             |           |               |
| With chronic disease           | 176       | 31.15         |
| Without chronic disease        | 389       | 68.85         |

AMI=average monthly income, MISUR=medical insurance system for urban residents, NRCMS=new rural cooperative medical system.

## 2.5. Quality control

We conducted this survey while patients waited to receive care, given there is a major time lag when seeking treatment in large provincial tertiary hospitals. The survey questionnaires were completed by qualified respondents independently. There were no financial incentives to complete the voluntary survey. All responses were anonymous in an attempt to limit potential response bias. Furthermore, our survey questionnaire contained only 10 core items, which was meant to limit strain on individuals waiting for medical treatment. Completed surveys were checked to ensure limited missing values with incomplete questionnaires returned to respondents to complete the survey either themselves or with the help of research staff. Double data entry and logical

**Table 2**

## The current status of outpatients' knowledge, attitudes, and practices related to establishment of the National Hierarchical Medical System.

| Items                  | Frequency | Percentage, % |
|------------------------|-----------|---------------|
| Outpatients' knowledge |           |               |
| Positive answer        | 293       | 51.86         |
| Negative answer        | 272       | 48.14         |
| Outpatients' attitudes |           |               |
| Positive answer        | 422       | 74.69         |
| Negative answer        | 143       | 25.31         |
| Outpatients' practices |           |               |
| Positive answer        | 124       | 21.95         |
| Negative answer        | 441       | 78.05         |
| Total                  | 565       | 100.00        |

verification of the questionnaires were also done to ensure the accuracy of the data.

## 2.6. Ethical statements

The study protocol was reviewed and approved by the Institutional Review Board of Wuhan University (IRB number: J-17-2016) within China. Local institution protocols at Wuhan University were followed to protect participants' confidentiality and ensure culturally appropriateness (e.g., appropriate survey item wording for the general population). Hospitals are considered public places in China, and approval from the ethics committees of the hospitals was not required.

## 3. Results

### 3.1. Descriptions of sample demographic information

This study sample included a total of 565 subjects, including 307 males (53.34%), with the largest age group being those aged 46 to 65 years at 34.69% followed by 26 to 45 at 33.10%. Overall, 397 respondents (70.27%) had a high school education or less. The distribution of respondents' average monthly income is listed as follows: 181 respondents (32.04%) were below 3000 yuan, 199 respondents (35.22%) ranged from 3000 to 4999 yuan, and 106 respondents (18.76%) ranged from 5000 to 6999 yuan. Of the 565 subjects, 329 respondents (58.23%) resided in and traveled from rural areas, 303 respondents (53.63%) were involved in New Rural Cooperative Medical System (NRCMS), and 176 respondents (31.15%) had at least 1 chronic non-communicable diseases. Participants' general socio-demographic characteristics are summarized in Table 1.

### 3.2. The current status of outpatients' KAP related to establishment of NHMS

According to our survey, 293 respondents (51.86%) perceived they knew what the NHMS was, and most of the respondents (74.69%) expressed a positive attitude toward the effect of NHMS. However, there were also 25.31% participants who doubted that the NHMS could solve the current problem of poor access and high cost (fees) for health care in China, with 124 (21.95%) of respondents expressing their willingness to choose a general practitioner in a primary care setting (i.e., sub-unit hospitals) as their first-contact doctor under the NHMS. The results of outpatients' KAP survey on establishment of NHMS showed that nearly half (48.14%) of respondents lacked knowledge of the NHMS, with most (74.69%) responding with a positive attitude toward the NHMS. Overall, most (78.05%) responded that the practice of seeking care from a general practitioner in a primary care setting would likely not be welcome (see Table 2).

### 3.3. Analysis on the diverse knowledge levels toward NHMS

In unadjusted analyses predicting a lack of knowledge of the NHMS, we found that individuals in older age groups including those aged 46 to 65 (COR=1.62, 95% CI: 1.16–3.38) and those aged more than 65 years (COR=1.58, 95% CI: 1.23–2.97) were more likely to lack knowledge of the NHMS. Further, those with lower education were also more likely to lack knowledge of the NHMS when compared to those with higher educations

**Table 3****Logistic regression analysis for the association between participants' socio-demographic and knowledge of the National Hierarchical Medical System.**

| Demographics                   | No<br>n = 272 (48.14%) | Yes<br>n = 293 (51.86%) | Crude OR (95%CI)   | Adjusted OR (95%CI) |
|--------------------------------|------------------------|-------------------------|--------------------|---------------------|
| Sex                            |                        |                         |                    |                     |
| Male                           | 142 (46.25)            | 165 (53.75)             | —                  | —                   |
| Female                         | 130 (50.39)            | 128 (49.61)             | 1.18 (0.85–1.64)   | 1.19 (1.001–2.12)*  |
| Age                            |                        |                         |                    |                     |
| ≤25                            | 35 (42.17)             | 48 (57.83)              | —                  | —                   |
| 26–45                          | 78 (41.71)             | 109 (58.29)             | 0.98 (0.38–1.39)   | 0.92 (0.30–1.24)    |
| 46–65                          | 106 (54.08)            | 90 (45.92)              | 1.62 (1.16–3.83)*  | 1.57 (1.13–1.91)*   |
| >65                            | 53 (53.54)             | 46 (46.46)              | 1.58 (1.23–2.97)*  | 1.55 (1.32–2.26)**  |
| Education level                |                        |                         |                    |                     |
| ≤Junior high school            | 205 (51.64)            | 192 (48.36)             | —                  | —                   |
| Bachelor's degree              | 42 (41.18)             | 60 (58.82)              | 0.66 (0.37–0.78)*  | 0.63 (0.42–0.84)*   |
| ≥Master's degree               | 25 (37.88)             | 41 (62.12)              | 0.57 (0.33–0.84)** | 0.59 (0.46–0.87)**  |
| AMI (CNY)                      |                        |                         |                    |                     |
| <3000                          | 95 (52.49)             | 86 (47.51)              | —                  | —                   |
| 3000–4999                      | 95 (47.74)             | 104 (52.26)             | 0.83 (0.54–1.33)   | 0.85 (0.44–1.21)    |
| 5000–6999                      | 50 (47.17)             | 56 (52.83)              | 0.81 (0.48–1.31)   | 0.83 (0.56–1.31)    |
| ≥7000                          | 32 (40.51)             | 47 (59.49)              | 0.62 (0.52–1.43)   | 0.66 (0.51–1.55)    |
| Place of residence             |                        |                         |                    |                     |
| Urban                          | 153 (46.50)            | 176 (53.50)             | —                  | —                   |
| Rural                          | 119 (50.42)            | 117 (49.58)             | 1.17 (0.84–1.63)   | 1.21 (1.13–2.26)*   |
| Types of health care insurance |                        |                         |                    |                     |
| No insurance                   | 33 (49.25)             | 34 (50.45)              | —                  | —                   |
| Yes, NRCMS                     | 144 (47.52)            | 159 (52.48)             | 0.93 (0.46–1.73)   | 0.94 (0.43–1.64)    |
| Yes, MISUR                     | 95 (48.72)             | 100 (51.28)             | 0.98 (0.54–1.59)   | 0.96 (0.61–1.86)    |
| Physical condition             |                        |                         |                    |                     |
| With chronic disease           | 85 (48.30)             | 91 (51.70)              | —                  | —                   |
| Without chronic disease        | 187 (48.07)            | 202 (51.93)             | 0.99 (0.69–1.41)   | 1.01 (0.97–1.66)    |

\*  $P$ -value < .05; \*\*  $P$ -value < .01.

AMI = average monthly income, CI = confidence interval, MISUR = medical insurance system for urban residents, NRCMS = new rural cooperative medical system, OR = odds ratio.

(bachelor's degree, COR = 0.66, 95% CI: 0.37–0.78; master's degree, COR = 0.57, 95% CI: 0.33–0.84).

In multivariable analyses, similar results were identified for age and education. In addition, sex and rurality were also related, where females were more likely to lack knowledge of NHMS as compared to males (AOR = 1.19, 95% CI: 1.001–2.12) and rural residents were also more likely to lack knowledge of NHMS as compared to urban residents (AOR = 1.21, 95% CI: 1.13–2.26), after controlling for all other terms in the model.

### 3.4. Correlations between respondents' KAP on establishment of NHMS

Spearman rank correlation was used to analyze the potential correlation between respondents' KAP on establishment of NHMS (see Table 4). The results indicate that there was a

**Table 4****Correlations between outpatients' knowledge, attitudes, and practices on establishment of the National Hierarchical Medical System.**

| Variables | Knowledge | Attitudes | Practices |
|-----------|-----------|-----------|-----------|
| Knowledge | 1         | —         | —         |
| Attitudes | 0.41*     | 1         | —         |
| Practices | 0.12      | 0.23      | 1         |

\* Correlation is significant at the 0.01 level (2-tailed).

significant correlation between outpatients' knowledge of the establishment of NHMS and their attitudes ( $r_s = 0.41$ ,  $P < .01$ ).

## 4. Discussions

Knowledge of the NHMS is limited among outpatients who are likely candidates of receiving more appropriate routine medical care from general practitioners in primary care settings, rather than more costly care from specialist in larger tertiary hospitals. This potential misuse or overuse of more costly care may be targeted with improved knowledge of the utility of the NHMS among potential patients. Those in most need of targeted outreach and those who may potentially benefit most may include those residing in rural areas, those with limited education (high school or less), those who are female, and those who are middle-aged and older.

The NHMS attempts to differentiate patients' medical need according to the real nature of the needed medical care while taking into account disease status, type, severity, and best treatment options. Thus, the goal is to carry out the disease diagnosis and treatment activities based on the principle of delivering appropriate care while avoiding misuse, overuse, and underuse of appropriate medical care as in other parts of the world such as the US.<sup>[15]</sup> Establishing the NHMS is critically important if China is to break the "inverted triangle" of health resource allocation and narrow the gap of the equalization of essential healthcare services between urban and rural areas.<sup>[11,13]</sup> According to the *Guidance of establishing National Hierarchical*



*Medical System* promulgated by the General Office of the State Council of the People's Republic of China, China will implement the NHMS through 2020.<sup>[16]</sup> To some extent, the NHMS may be capable of changing Chinese outpatients' preferences for large tertiary hospitals for routine medical services.<sup>[17]</sup> However, progress on outpatients' KAP related to the establishment of NHMS remains to be seen and, as identified in the current analyses has much room for improvement.

## 5. Limitations

There are several limitations that should be taken into account when framing the implications of the current study. Causal inference is not implied, as the study was restricted to a cross-sectional design. The generalizability of the current study is limited given the relatively small sample in a single Province in China. In addition, the sampling of individuals was not random and as such, nonresponse bias may have affected the results. Further, the inclusion of outpatients only may not be reflective of many including, but not limited to those forging medical care due to cost or those unable to travel to seek care for a variety of reasons.

## 6. Conclusions and policy implications

We suggest policymakers target public outreach and awareness to those lacking knowledge of the NHMS, especially those residing in rural areas who may have longer distances to travel when seeking care and those with less education. Further older adults, who may utilize care more often with increasing age may also serve as targets for outreach.<sup>[18]</sup> Possible platforms for knowledge dissemination include using emerging media outlets such as WeChat, microblogging, and traditional media such as newspapers simultaneously to spread public awareness and knowledge regarding NHMS.

Our study revealed that the majority of participants (74.69%) believed that NHMS could play a role in improving current issues surrounding poor access to health care services and high fees for health care services in China, which indicates the NHMS is favorable among some. This finding is both encouraging and important for policymakers involved in the implementation of this policy reform. However, currently, most outpatients (78.05%) are still reluctant to choose a general practitioner in a primary care setting (versus tertiary hospitals) as their first point of contact for routine medical care. This hesitation may be related to current unsatisfactory conditions of China's primary medical institutions.<sup>[19,20]</sup> Further, financial needs may be related to underutilization of primary care settings, especially for rural residents.<sup>[21]</sup> The successful implementation of the NHMS may depend, in part, on the strength of primary medical institutions. Patients may choose primary care settings when they can provide more affordable and higher-quality medical services for consumers. Thus, policymakers should consider increasing both financial and preferential policy support for primary medical institutions. Further, training qualified health personnel to serve in these settings is another critical component to improve the overall medical service capacity and quality of care in primary care settings.

At the same time, the results also showed that the attitude of outpatients from tertiary hospitals toward the NHMS are positively correlated with their knowledge of the NHMS, which indicates that increasing the awareness rate of the NHMS contributes to improved approval of establishing the NHMS. The

reasons behind this require additional research including continued observation and in-depth interviews and other qualitative research methods. Future studies should also include larger geographic areas to increase generalizability.

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