

# Quality of care in Hunan Province nursing homes: relationship to staffing and organizational climate

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## Research article

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# Abstract

**Background:** Confounding factors, such as staff characteristics and organizational features, are neglected in most studies when assessing the relationship between staffing levels and quality of care, and previous research provides inconsistent conclusions. The aim of this study was to examine the quality of care perceived by nursing staff and its relationship with the staffing and organizational climate in nursing homes. **Methods:** A cross-sectional study was conducted. This study included 358 nursing staff from 52 units in 26 nursing homes in Hunan Province, China. Organizational climate was assessed with the Nursing Home adaptation Shortell scale and work stress scale. Staffing levels were studied by interviewing unit managers. Self-reported quality of care was measured with a single item. **Results:** The interaction effect between nursing staff to resident ratio and physician to resident ratio was significant on quality of care ( $p < 0.05$ ). Higher score on the relationships and communication scale ( $OR = 4.771$ ,  $p = 0.002$ ) and lower score on the work stress scale ( $OR = 0.980$ ,  $p = 0.050$ ) were also associated with better quality of care. More work experience was related to lower quality of care ( $OR = 0.942$ ,  $p = 0.044$ ), and work experience was associated with relationships and communication ( $Beta = 0.115$ ,  $p = 0.037$ ) and work stress ( $Beta = 0.234$ ,  $p = 0.000$ ). **Conclusions:** Staffing level, work experience, work stress, relationships and communication are key factors to consider when the objective is to provide higher quality of care in nursing homes.

## Background

By 2017, there were 155,000 nursing homes in China with 7.4 million beds.[1] However, nursing homes deliver suboptimal performance in caring for residents, and adverse events in nursing homes are frequently reported, e.g. the incidence rate of falls ranges from 14.7% - 34%, the rate of pressure ulcers ranges from 7.1% - 25%, and the rate of urinary incontinence is approximately 65.8% in Chinese nursing homes.[2-4] Thus, the rapid growth of nursing homes in China has attracted great public concern about the quality of care provided in Chinese nursing homes.[1]

As in other countries, the current nursing workforce in Chinese nursing homes is insufficient to meet the demands of the aging population.[5] Most nursing staff in nursing homes come from remote rural areas, with low education levels and very little training in nursing home care.[6] Nursing staff are under enormous pressure to care for residents who are highly dependent as well as for those who have dementia.[5] The turnover rate of employees in nursing homes is high and contributes to cost increases and staffing shortages[7]. The low staff to resident ratio, widely reported, leads to suboptimal care for residents in Chinese nursing homes.[6, 8] However, the relationship between staffing levels and quality of care remains unclear, and the Chinese government has made little progress in establishing optimal nursing home staffing levels, which could negatively affect the quality of care provided.[8] Many research efforts have been made to assess the relationship between nursing staffing levels and quality of care, mostly based in developed countries, but the research has provided inconsistent conclusions. The association between the number of staff and quality may differ due to confounding factors, such as staff characteristics (e.g. staff training and experience) and organizational features (e.g. work stress, care

organization and management). What may be positive in one context may be negative in another.[9] Some researchers argue that staff characteristics and organizational features should be addressed simultaneously to assess the relationship between staffing and quality of care for the interaction effect. [9, 10] In addition, a majority of studies have focused on the influence of nursing staffing levels on quality of care, but have neglected to address physician staffing levels.[10] Studies seldom combine nursing staff levels with physician staff levels when assessing the relationship between staffing levels and quality of care.[10, 11] Nursing staff deliver physician care in nursing homes, often in consultation with geriatricians. Physician staffing might influence the relationship between nursing staffing and quality of care, or directly influence quality of care.[10] Therefore, this study will integrate staff characteristics and organizational features with nursing and physician staffing levels when exploring the relevant factors contributing to quality of care.

At present, measurement of quality has concentrated heavily on clinical outcomes. While important, these approaches ignore the quality that is defined by nursing staff who provide care directly.[9] Nursing staff have insight into aspects of quality of care that are not necessarily recorded in resident files.[14] Self-reported quality of care is seen as a primary data source.[17] Nursing staff self-reported quality of care is not based on isolated contacts, medication incidents, or other incidents such as resident falls, but has developed over time with a comprehensive perception of a resident's care.[14] Many studies have confirmed that self-reported quality of care is suitable to assess the quality of care in nursing homes.[11, 14]

## **Methods**

### **Aims**

The aim of our study is (i) to describe the quality of care and (ii) examine the relationship between staffing, organizational climate and nursing staff self-reported quality of care in China.

### **Study design and participants**

A cross-sectional study was conducted in Hunan, a Chinese province with that country's seventh largest population. The proportion of Hunan's population aged 60 years or over was 18.16% in 2017.[18] There are 121 state-owned nursing homes and 205 not-for-profit privately-owned nursing homes of thirteen cities in Hunan Province.[19] A cluster random sampling method was used to recruit staff from nursing homes of each city in Hunan Province. SPSS version 24.0 was used to randomly select around ten percent of nursing homes from each city. All selected nursing homes from the 13 thirteen cities were invited to participate in the study via a letter of invitation sent to the facility manager, see detail sample frame in figure 1.

**[Insert figure 1 here]**

In total 26 nursing homes, or 76.4% of the total numbers in the selected nursing homes agreed to participate in the study, evidenced by returned letters and information about the total number of hospitalized residents, nursing staff and physician from unit managers. Unit managers were invited to participate in a brief, voluntary interview concerning unit size, the number of nursing staff and physician. Unit size is the current number of hospitalized residents in the unit. Nursing staff included registered nurses, certified nursing assistants and uncertified nursing assistants, but not student nurses or private caregivers in the unit. Physicians included all physicians in the unit excluding medical interns and physicians working as the consulting doctor in the unit. In addition, the unit managers were asked to distribute questionnaires to their nursing staff. The questionnaires were collected and checked on the spot for integrity by investigators. The inclusion criteria are: (i) having worked for at least one month in the unit; (ii) having the capability to understand and complete the questionnaire; (iii) volunteering to participate in the study. The exclusion criteria were: (i) caring for residents indirectly (e.g. mentoring or managing); (ii) caring for residents directly but less than 16h per week.

## **Data collection**

### *Shortell and colleagues' Organization and Management Survey*

The scale has been adapted for nursing homes and widely used worldwide with good reliability and validity.[20-22] The Nursing Home adaptation is a 26-item scale with two subscales: Relationships and Communication scale (15 item) and Teamwork and Leadership scale (11 item).[21] And a higher score of the scale indicates a better organizational climate.[20]

No Chinese version of the Nursing Home adaptation Shortell scale was available for our study. To evaluate cross-cultural validity, the scale was translated and back-translated with the permission of Dr. Jill Scott-Caziewell. The final Chinese version was tested for respondent comprehension by a pilot study with 30 nursing staff to ensure that all items were actually suitable for a Chinese context. Ultimately, one item was dropped, as it had no correlations with the scale, and Cronbach's  $\alpha$  improved from 0.84 to 0.86. Cronbach's  $\alpha$  for the two subscales was 0.75 and 0.84.

### *Work stress scale (WSS)*

### *Staffing levels*

'Nursing staffing levels' is defined as the nursing staff to resident ratio, and 'physician staffing levels' is defined as the physician to resident ratio.[23]

### *Self-reported quality of care from nursing staff*

Quality of care was assessed by a single item on a 4-point Likert scale that was dichotomized as very low or rather low, as opposed to rather high or very high, and nursing staff were asked to rate quality of care

on a unit level. This single item had been shown to be a valid measurement of quality of care in nursing homes. The intraclass correlation was 0.69 on a unit level and 0.80 on a facility level.[11]

## **Data handling and analysis**

Binary logistic regression analyses were used to examine the relationship between organizational climate and staffing and quality of care. Three multiple linear regressions and three univariate analyses of variance were conducted to analyze the direct impact of staffing on organizational climate. We also explored the correlations among these impact factors of quality of care by Pearson's correlation analysis. T-tests for independent samples were used to compare the different work stress scores in the two nursing work schedules. Additionally, data with missing values were not included in the analysis.

## **Results**

The final sample consisted of 358 nursing staff from 52 units in 26 nursing homes (see detail characteristics of nursing staff in Table 1). Nursing staff gave high mean ratings for overall quality of care in their units, with 30.2% reporting that their units had very high quality of care and 67.5% reporting rather high quality of care. Only 2.0% rated care quality as rather low and 0.3% rated it as very low.

**[Insert Table 1 here]**

### **The impact of organizational climate and staffing on quality of care**

The dependent variable in the logistic equation is quality of care measured as a dichotomy with 1= very high and 0= rather high. The two poorer ratings were omitted because so few nursing staff chose those responses. The self-reported quality of care is the dependent variable, and relationships and communication, teamwork and leadership, and work stress are the independent variables (Model 1). The results of the logistic regression analysis (Table 2) showed that better relationships and communication were related to better quality of care (OR=4.771, p=0.002), and higher work stress was related to lower quality of care (OR=0.980, p=0.050). After adding the nursing staff to resident ratio, physician to resident ratio and work experience to the "dependent variables" (Model 2), the results (Table 2) showed that relationships and communication were still significant and the OR increased, but work stress became insignificant. More work experience was related to lower quality of care (OR=0.942, p=0.044).

**[Insert Table 2 here]**

## **The impact of staffing on organizational climate**

The results of the three multiple linear regressions showed (Table 3) that work experience was associated with relationships and communication (Beta=0.115, p=0.037) and work stress (Beta=0.234, p=0.000). This means that work experience might have influenced quality of care through relationship and communication and work stress.

**[Insert Table 3 here]**

## **The interaction effect between nursing staff to resident ratio and physician to resident ratio on organizational climate and quality of care**

The interaction effect between nursing staff to resident ratio and physician to resident ratio was significant in terms of quality of care, work stress, relationship and communication, teamwork and leadership (Table 4). Nursing staff gave the highest scores for the quality of care, relationship and communication, and teamwork and leadership scales; and the lowest scores on the work stress scale when the nursing staff to resident ratio was more than 0.44 and the physician to resident ratio was less than 0.07 (Table 5).

**[Insert Table 4 here]**

**[Insert Table 5 here]**

## **The impact of work schedule and work experience on work stress**

Nursing staff working on a flexible schedule perceived higher work stress than those working according to a fixed schedule (p<0.05). (Table 6).

**[Insert Table 6 here]**

## **Discussion**

Overall, nursing staff from all units were satisfied with the quality of care in their units, with 97.7% of nursing staff reporting that their units had very high or rather high quality of care. In comparison, in nursing homes 93.3% of staff in Swiss gave a high or very high rating to the quality of care, 80% of

nursing staff in Germany rated the good quality of care;[11, 24] While in the research on hospital, a large study over 12 countries found that the percentage of good quality of care rated by nurses was from 53% in Greece, 65% in Germany, 80% in Switzerland, and 84% in the USA, and to 89% in Ireland.[25] So we guess that the quality of care rated by staff are highly inflated anyway so that it makes sense to contrast the very high quality of care with rather high quality of care are. And we think of very high quality of care equals to Good Quality and rather high quality of care equals to Good Quality with some problems.

Our finding that a higher score on the relationships and communication scale was associated with higher quality of care was similar to previous research.[26] Nursing staff in this study perceived relationships and communication levels in their units to be somewhat lower than the relationships and communication levels in a study conducted in Australia.[21] A high level of communication was a key factor in resident health outcomes, as it allowed staff to receive support and knowledge from peers and to share knowledge more deliberately, and from a series of different perspectives.[27] In addition, in the present study a lower score on work stress was significantly related to higher quality of care. Reducing work stress by 10 and 20 points, the odds of the highest quality of care increased to 1.221 and 1.492, although the OR for work stress in the model (increasing work stress by 1 point) was very close to one (0.980). This is consistent with the findings of the Swiss nursing home study, which noted that high stress due to workload was related to decreased quality of care.[11] The results suggest that management interventions could focus on promoting staff communication and reducing work stress in order to achieve higher quality of care.

Work experience influenced the quality of care by affecting the level of communication and relationships and the level of work stress that nursing staff perceived. Contrary to our expectations, more work experience was associated with higher work stress and lower quality of care. In this study, among all staff who were working flexibly, the percentage of nursing staff who had been working for more than five years (56.6% or 57.8%) is obviously higher compared to nursing staff who had been working for less than five years (38.9%). We found that nursing staff working flexibly scored higher on work stress than those working according to a fixed schedule. Nursing staff in Chinese nursing homes were characterized by their low levels of education and lack of necessary knowledge to care for residents, especially in Hunan, while experienced nursing staff were often asked to care for very ill residents and to handle sudden changes in residents' health.[6, 28] A recent study in China found that nursing staff with considerable work experience often worked flexibly without a set number of residents, and were more likely to be involved in assisting when adverse events occurred, which might be a reason for them to report higher work stress and lower quality of care.[28] In addition, in China, as in the developed counties, difficult existed in the retention of nursing staff.[29] The high turnover rate of nursing staff led to shortages of experienced workers. In this study, only 12.6% of nursing staff had more than 10 years of experience. A few nursing staff with rich experience in caring for residents were required to care for a large number of high-dependent residents with complex medical conditions. Highly dependent residents asked for high professional requirements in the nursing staff, which led experienced nursing staff to perceive a high pressure environment in caring for residents. This finding indicates that nursing home managers need to reconsider the work schedules of experienced nursing staff and they need to provide them with strong

support, such as taking steps to decrease their stress levels and encouraging the development of coping skills to handle stress more effectively. In addition, management interventions could focus on improving the professional abilities of low-seniority nursing staff, which would help decrease stress levels in experienced staff. Management interventions need to focus on decreasing the turnover rate and enhancing the overall working experience of nursing staff in nursing homes.

The interaction effect between the nursing staff to resident ratio and physician to resident ratio on quality of care was significant, and significantly, nursing staff rated care as being of the highest quality when the nursing staff to resident ratio was more than 0.44 and the physician to resident ratio was less than 0.07. This is in agreement with previous research, which found that staffing levels and quality of care had a complicated non-linear relationship.[9] It appears that higher staffing levels are correlated with better quality of care, however, this is not the case for financial constraints.[30] Our study also found that staff earned the highest wages when the nursing staff to resident ratio was more than 0.44 and the physician to resident ratio was less than 0.07. Overstaffing might reduce personal income and lead to a reduction in staff engagement at work.[30] More daringly, we suggest there could be a range between low staffing levels and high staffing levels, in terms of which nursing homes could achieve the highest quality of care possible, however, more research is required to explore an accurate range of what would be the most appropriate staffing levels in Chinese nursing homes. The interaction effect between nursing and physician staffing levels not only impacts quality of care, but also work stress, teamwork and leadership. Under the above mentioned staffing levels, not only did care reach the highest quality, but the teamwork and leadership scores were also obviously higher, and the scores on the work stress scale were obviously lower than the scores under any other staffing levels seen in this study. This indicates that work stress, teamwork and leadership might be factors contributing to this non-linear relationship. Further studies are required to explore these complex relationships. This study finding might provide significant references for the government to set nursing and physician staffing standards in nursing homes.

## Limitations

The present study had some limitations. First, this study's sample size is too small to examine the accuracy range for nursing and physician staff levels suitable in Chinese nursing homes, and the accuracy range needs to be checked with large scale studies in the future. Second, not all staff members could report freely on quality. They may have felt guilty about not giving residents enough attention, or they may have felt a stronger sense of loyalty to the nursing home and not wanted to expose any quality of care deficiencies though they have been informed that all information provided would be collected in a de-identifiable form and treated confidentially. Therefore, self-reported quality of care could not completely reflect actual quality of care. Further research with additional outcome measures are needed to corroborate the relationships among staffing, organizational climate and quality of care.

## Conclusions

Overall, nursing staff from all units were satisfied with the quality of care in their units. Better relationships and communication climate, and lower work stress were associated with higher quality of care. Work experience might influence the quality of care by affecting the level of work stress and the level of communication and relationship. More work experience was associated with higher work stress. Our findings suggest that management interventions might focus on promoting staff relationships and communication, and decreasing staff work stress to achieve higher quality of care, with particular attention being paid to relieving experienced nursing staff of the pressure of caring for residents. Further studies would be needed to evaluate the effect of organizational climate interventions on improving quality-related outcomes, including not only nursing staff self-reported quality of care, but also physical and psychological health outcomes for residents.

## **Declarations**

### **Ethics approval and consent to participate**

All staff in the study provided informed consent. Ethical Approval was gained from the Nursing and Behavioral Medicine Institutional Review Boards, Xiangya School of Nursing, Central South University (Approval number: 2017035).

### **Consent for publication**

Not applicable

### **Availability of data and material**

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

### **Competing interests**

No conflict of competing interest has been declared by the authors.

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### **Authors' contributions**

HL, YXY, HF and LDX designed the study. HJC and LLL performed most of the data collection. JAW, HL and HYH undertook the analysis and interpretation of data. HL, and YXY wrote the first draft of the paper. HF, LDX and LLP reviewed the draft. All authors contributed to manuscript preparation and approved the final manuscript.

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## Tables

**Table 1 Characteristics of variables**

<b>Variables</b>	<b>Mean</b>	<b>SD</b>	<b>%</b>	<b>Missing (n) [%]</b>
<b>Gender(female)</b>			96.9	0(0)
<b>Age (years)</b>	40.5	15.7		13(3.6)
<b>Educational background</b>				3(0.8)
Senior high school or below			59.5	
Junior college			28.5	
Bachelor or above			12.0	
<b>Years of work experience</b>	5.5	5.4		19(5.3)
≤5 years			61.6	
6-10 years			23.7	
≥11years			12.6	
<b>Schedule</b>				12(3.4)
Flexible			45.8	
Fixed			54.2	
<b>Salary per month (yuan)</b>	2771.3	843.5		14(3.9)
<b>Nursing Home adaptation Shortell scale</b>	3.70	0.33		0(0)
Relationships and Communication scale	3.73	0.28		0(0)
Teamwork and Leadership scale	3.63	0.42		0(0)
<b>Work stress scale (WSS)</b>	55.07	14.09		4(1.1)
<b>Nursing staff to resident ratio</b>	0.44	0.17		6(1.6)
<b>Physician to resident ratio</b>	0.19	0.26		1(0.3)
<b>Self-reported quality of care</b>				0(0)
Very high			30.2	
Rather High			67.5	
Rather Low			2.0	
Very low			0.3	

Table2 Logistics analysis of the association between organizational climate and self-reported quality of care

	Model 1			Model 2			Characteristics of independent variables (Mean ± SD)
	B	OR	p-value	B	OR	p-value	
Relationships and Communication scale	1.563	4.771	0.002**	1.781	5.934	0.001***	3.72±0.28
Teamwork and Leadership scale	0.847	1.628	0.174	0.458	1.581	0.218	3.64±0.42
Work stress scale	-0.020	0.980	0.050*	-0.016	0.984	0.132	55.07±14.10
Physician to resident ratio	-	-	-	0.528	1.696	0.801	0.19±0.26
Nursing staff to resident ratio	-	-	-	1.190	3.289	0.121	0.44±0.17
Years of work experience	-	-	-	-0.058	0.944	0.048*	-
Constant	-7.390	0.001	0.000		0.000	0.000	-

Noted: \*P < 0.05, \*\*P<0.01,\*\*\*P<0.001

**Table 3 Impact of staffing factors on Relationship and Communication scale, Teamwork and Leadership scale, Work stress scale**

	Relationships and Communication scale				Teamwork and Leadership scale				Work stress scale			
	B	SE	Beta	p-value	B	SE	Beta	p-value	B	SE	Beta	p-value
Nursing staff to resident ratio	0.19	0.355	0.021	0.717	0.683	0.351	0.115	0.052	4.343	4.679	0.053	0.354
Physician to resident ratio	-0.04	0.938	-0.003	0.961	0.994	0.927	0.063	0.284	33.467	12.390	0.154	0.007**
Years of work experience	0.03	0.011	0.172	0.002**	-0.006	0.011	-0.031	0.563	0.699	0.141	0.259	0.000**
Constant	2.34	0.163		0.000	2.110	0.161		0.000	47.043	2.152		0.000
R <sup>2</sup> (%)	3				2.4				10.6			

Noted: \* P < 0.05, \*\* P<0.01, \*\*\* P<0.001

**Table 4 Tests of interaction effect between nursing staff to resident ratio and physician to resident ratio**

	P-value			
	Quality of care	Relationships and Communication scale	Teamwork and Leadership scale	Work stress scale
nursing staff to resident ratio	0.000*	0.880	0.031*	0.764
physician to resident ratio	0.015***	0.736	0.791	0.014*
nursing staff to resident ratio*	0.003**	0.005**	0.006**	0.032*
physician to resident ratio				
Corrected Model	0.002**	0.047*	0.006**	0.010**
Adjusted R <sup>2</sup> (%)	5.8	1.4	2.7	2.4

Noted: \*P < 0.05, \*\*P<0.01, \*\*\* P<0.001

**Table 5 Descriptive Statistics based on staffing levels**

Nursing staff to resident ratio	Physician to resident ratio	Quality of care		Relationships and Communication scale		Teamwork and Leadership scale		Work stress scale		Salary per month (RMB)	
		EM	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
		Mean <sup>b</sup>									
Level 1 <sup>a</sup>	Level 1	0.23	0.42	3.70	0.26	3.53	0.34	54.08	11.78	2529	641
Level 1	Level 2	0.32	0.47	3.77	0.30	3.67	0.39	54.56	12.84	2516	717
Level 2 <sup>a</sup>	Level 1	0.52	0.50	3.79	0.32	3.76	0.38	51.17	10.46	3651	821
Level 2	Level 2	0.29	0.46	3.69	0.27	3.65	0.51	58.42	17.81	2656	769

<sup>a</sup> Level 1 is from minimum to the 50<sup>th</sup> percentile; Level 2 is from the 50<sup>th</sup> percentile to maximum. The 50<sup>th</sup> percentile for nursing staff to resident ratio is 0.44, and the 50<sup>th</sup> percentile for physician to resident ratio is 0.07.

<sup>b</sup> EM Means: Estimated Marginal Means

**Table 6 Impacts of work schedule and work experience on work stress**

Work experience	Fixed schedule		Flexible schedule		Group comparison
	N (%)	M±SD	N (%)	M±SD	P-value
≤5	126(61.1)	50.43±10.84	80(38.9)	55.19±16.30	0.023*
5-10	36(43.4)	51.92±10.16	47(56.6)	64.13±14.20	0.000***
≥11	19(42.2)	55.42±10.55	26(57.8)	67.27±16.47	0.005**
Total	181(54.2)	51.25±10.73	153(45.8)	59.99±16.44	0.000***

Noted: \*P < 0.05, \*\*P<0.01, \*\*\* P<0.001

# Figures

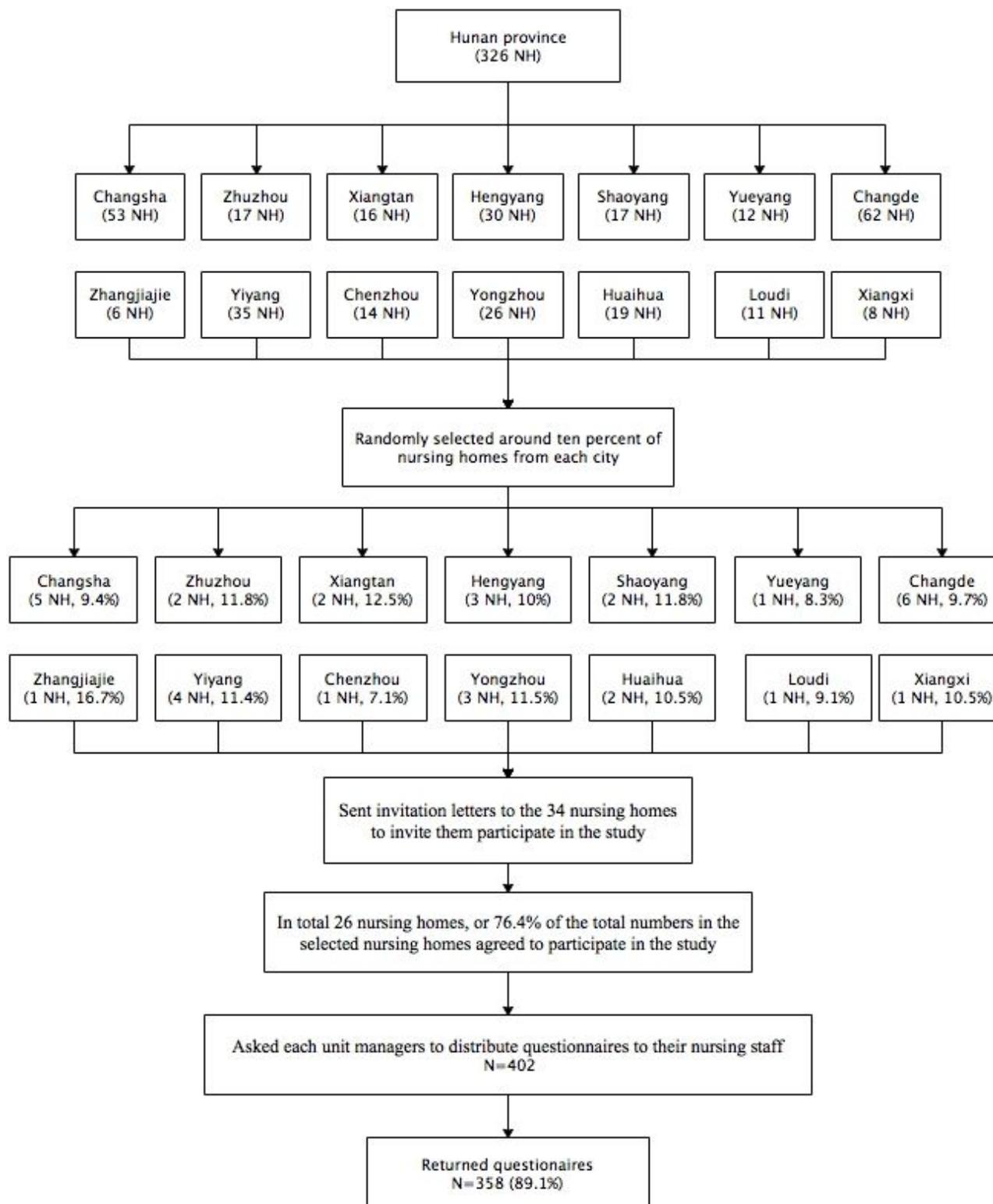


Figure 1

The sample frame