

# Analysis of Hypertension Status and Its Influencing Factors in Some Areas of Hubei Province, China

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## Abstract

**Objective:** To know about the current situation of hypertension in some areas of Hubei Province and analyze the influencing factors. **Methods:** According to the principle of Stratified sampling, we conducted health examination and questionnaire survey for 1500 residents over the age of 18 at observation point of chronic noninfectious diseases at 10 sub-districts (towns) of Wuhan City, Jingzhou City, Huanggang City, Shiyan City, which used descriptive statistics and logistics to regressively analyze Current situation of hypertension and its influencing factors of residents. **Results:** Prevalence of hypertension of rural and urban residents over 18 is 27.44% in Hubei province. There are many differences among prevalence of hypertension of male and female, distribution of BMI of rural and urban residents and prevalence of hypertension and so on, and it has statistical significance ( $P$ -value < 0.05 averagely); logistic regressive analysis result shows that different age, gender, education level, dieting habits (high salt and high oil), family per capita monthly income, BMI have statistical significance on the prevalence of hypertension in urban and rural residents of Hubei Province. **Conclusions:** The prevalence of hypertension in the residents of five cities and prefectures in Hubei Province is on the trend of rising in ladder form and at a much earlier age. The health education, monitoring

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and intervention of chronic diseases need to be widely carried out, with emphasis on the intervention of the residents' eating habits of high salt and oil, smoking, drinking and other bad lifestyle.

## Keywords

Hypertension, Affecting Actors, Risk Factors, Effectiveness of Intervention

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## 1. Introduction

Located in the middle of China, middle reaches of the Yangtze River, Hubei is a typical region of subtropical monsoon area. It spans 108°21'42"E - 116°07'50"E and 29°01'53"N - 33°6'47"N. The terrain is generally surrounded by mountains in the East, West and North, and the middle is low and flat, which is an incomplete basin slightly open to the south. Hubei Province covers an area of 185,900 square kilometers, including 56% mountains, 24% hills and 20% plain lakes. Except for the regions of high mountains, most of them are the humid subtropical monsoon climate. The residents in Hubei Province take rice as staple food in their daily diet. They like fish, wine and tea. Including salted and smoked and spicy food. Their living habits are easily affected by the climate and environment. In the past 3 decades, with the rapid development of social economy, the lifestyle of residents has changed a lot. According to the statistical data of Medical Institution Services of Hubei Province, the prevalence of hypertension, hyperglycemia, hyperlipidemia and other chronic diseases is increasing year by year. In order to learn about the current situation of hypertension of residents and analyze its affected factors, researchers conducted a sampling survey of health condition for 1487 residents at 10 sub-districts (towns) of Wuhan City, Jingzhou City, Huanggang City, Shiyan City. The report is as follows.

## 2. Data Sources and Method

### 2.1. Data Sources

According to the distribution of populations, the level of social economic development, regional transport and distribution of medical resources, etc. The method of stratified cluster sampling was adopted. We chose 1487 residents over 18 at observation point of chronic noninfectious diseases at 10 sub-districts (towns) of Wuhan City, Jingzhou City, Huanggang City, Shiyan City as the subjects of research.

### 2.2. Method

#### 2.2.1. Survey Instrument

The project form of this health examination was formulated by School of Medicine and Health Management of Tongji Medical College of Huazhong University of Science and Technology, which combines standard test of medical institution services of Hubei Province and the demand for research. It mainly includes de-

sign process, structure, scale design, sampling framework, sampling methods, and sample size, which collected the age, gender, height, weight, BMI (body mass index), blood routine examination, urine routine examination, electrocardiogram, abdominal B-ultrasound and other information, which were used to preliminarily diagnose their prevalence situations [1]. The questionnaire mainly adopts self-made ones to collect patients' household registration (because of dual economy structure of the urban and rural areas and management system, there are some differences which are now reducing in the level of health insurance between urban and rural residents) educational attainment, career (before retirement), marital status, monthly income per capita, habit of diet, (salted and smoked, hot and sour, high salt and high fat food lover or not), smoker (Y/N), Alcoholics (Y/N), drug abuser (standardized medication under advice or not), medical expenses, basic medical insurance and other situations. The disease diagnosis and classification criteria of subject of research are mainly based on *Diagnosis of clinical diseases and evaluation criteria of curative effect* [2] and *guidelines for prevention and control of hypertension in China* (2018 version) [3], which is compiled by Ming Sun and Weiwen Wang. Diagnostic criteria of hypertension. In the absence of antihypertensive drugs, the systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg were measured three times. BMI standard, light weight (BMI < 18.5), healthy weight ( $18.5 \leq \text{BMI} < 24$ ), overweight ( $24 \leq \text{BMI} < 28$ ), obesity ( $28 \leq \text{BMI}$ ).

### 2.2.2. Method of Gauge Collection

The survey was conducted by the research workers who had been trained professionally and had more than 3 years of relevant medical knowledge background. The questionnaire was verified one-to-one and the quality of filling in the questionnaire was strictly controlled. In this survey, 1500 questionnaires were sent out and 1487 valid questionnaires were collected, with a recovery rate of 99.13%.

### 2.2.3. Statistical Method

After all the data of physical examination and questionnaire were collected, all the options were Coded quantization. We used Stata 13.0 to conduct input and descriptive analysis, the measurement data were analyzed by t-test and the count data were analyzed by variance, and multi-factors by logistic regression, with statistical significance when  $P < 0.05$  differently on both sides.

## 3. Results and Analysis

### 3.1. General Information

The basic information of all respondents is shown in **Table 1**. The results of BMI measurement showed that 322 people (21.65%) with  $24 \leq \text{BMI} < 27$ ; 143 people (9.62%),  $27 \leq \text{BMI} < 30$ ; 91 people (6.12%),  $30 \leq \text{BMI} < 35$ ; 23 people (1.55%),  $\text{BMI} \geq 35$ ; 322 people were overweight, accounting for 21.47% which were slightly lower than the results of the national norm [4] [5]; the proportion of obesity was as high as 17.28%, slightly lower than results of domestic and foreign

**Table 1.** Basic information and composition of respondents.

	<b>Project</b>	<b>Cases</b>	<b>Proportion</b>
<b>Gender</b>	male	743	49.53%
	female	757	50.47%
<b>Household registration</b>	urban	691	46.07%
	rural	809	53.93%
<b>Age (Year)</b>	18 - 29	278	18.53%
	30 - 39	316	21.07%
	40 - 49	324	21.60%
	50 - 59	374	24.93%
	≥60	208	13.87%
<b>Education level</b>	Primary school education and below	171	11.40%
	Junior middle school	413	27.53%
	Senior middle school or secondary vocational education	465	31.00%
	higher education and above	451	30.07%
<b>Career</b>	Agricultural (fishing)production	539	35.93%
	Industrial production	316	21.07%
	Commercial service industry	578	38.53%
	Public servant	67	4.47%
<b>Marital status</b>	unmarried	314	20.93%
	married	819	54.60%
	divorced	289	19.27%
	Widowed spouse	78	5.20%
<b>Insurance situation</b>	Medical insurance of urban workers	522	34.80%
	Medical insurance of urban and rural residents	973	64.87%
	without medical insurance	5	0.33%
<b>Monthly income per capita</b>	Up to 2000 yuan	337	22.47%
	2001 - 4000 yuan	794	52.93%
	4001 - 6000 yuan	236	15.73%
	6001 yuan and above	133	8.87%
<b>Smoking</b>	Never	477	31.80%
	smoking	883	58.87%
	smoked	140	9.33%
<b>Drinking</b>	Never	399	26.60%
	drinking	823	54.87%
	drank	278	18.53%

## Continued

<b>BMI</b>	Underweight	191	12.73%
	Normal weight	730	48.67%
	overweight	322	21.47%
	Mild obesity	143	9.53%
	Moderate obesity	91	6.07%
	Severe obesity	23	1.53%
<b>Dietary habits</b>	High-salt	1231	82.07%
	not high-salt	269	17.93%
	high fat	1314	87.60%
	not high fat	186	12.40%

research by scholars [6] [7] [8]. The proportion of high salt diet (more than 10 g salt per day) is as high as 82.07%, and the proportion of high fat diet (more than 30% of total energy intake per day) is 87.60%.

### 3.2. Physical Indicators and Health Condition of Respondents

The data of the main body constitution indexes of the investigated objects presented abnormal distribution. The mean systolic blood pressure of the subjects was  $129.40 \pm 28.50$  mmHg, mean diastolic pressure was  $83.60 \pm 15.30$  mmHg, among it, mean systolic pressure of urban residents was  $133.60 \pm 27.30$  mmHg, mean diastolic pressure was  $86.70 \pm 17.20$  mmHg, mean systolic blood pressure of rural residents is  $126.80 \pm 23.60$  mmHg, mean diastolic pressure is  $81.20 \pm 13.40$  mmHg. BMI: the number of those who were underweight was 191 (12.73%), 730 people were of normal weight (48.67%), 322 people were overweight (21.47%), 143 people were mildly obese (9.53%), 91 people are moderately obese (6.07%), There were 23 people (1.53%) with severe obesity, of which 335 were overweight and obese in urban residents (57.86%) and 244 were overweight and obese in rural residents (42.14%). The BMI distribution of urban and rural residents was greatly different, and had statistical significance ( $\chi^2 = 3.257$ ,  $P < 0.05$ ). The preliminary diagnosis results showed that there were 408 patients with hypertension, the incidence rate was 27.44%; among them, 277 were male patients with hypertension (67.89%), 131 were female patients with hypertension (32.11%), the incidence rate of male patients with hypertension was significantly higher than that of female, and the difference had statistical significance with  $\chi^2 = 9.531$ ,  $P < 0.01$ . 283 urban residents had hypertension (69.36%) and 125 had hypertension (30.64%). There was a significant difference between urban and rural residents in the incidence rate of hypertension and it had statistical significance with  $\chi^2 = 13.427$ ,  $P < 0.01$ . Among the respondents with hypertension, those were aged 18 - 29 was 41 (14.75% in the same ages); aged 30 - 39, were 68 (21.52% in the same ages); aged 40 - 49, were 78 (24.07% in the same ages); aged 50 - 59, were 106 (28.34% in the same ages); aged 60 and

above were 115 (55.29% in the same ages). The incidence of hypertension in different age groups was significantly different, with statistical significance of  $\chi^2 = 12.508$ ,  $P < 0.01$ .

### 3.3. Univariate Analysis of Hypertension

Univariate analysis was conducted on different age, gender, occupation, education level, marriage, monthly income per capital, BMI, smoking, drinking, dieting habits and insurance, the results showed that there was no significant difference in occupation, marriage, smoking, drinking, insurance. But other factors had statistical significance.

### 3.4. Multivariate Analysis of Hypertension

As shown in **Table 2**, the incidence of hypertension was taken as the corresponding variable (1 for yes, 0 for no), age, gender, education level, dieting habits (high salt and high oil), monthly income per capital and BMI were taken as the independent variables for Logistic regression analysis.

## 4. Discussion and Suggestions

### 4.1. There Was Huge Difference in the Incidence of Hypertension between Urban and Rural Residents

The results showed that the incidence of hypertension in urban and rural residents above 18 years old in Hubei Province was 27.44%, which was higher than the national norm in 2010 [9]. Among them, the incidence rate of hypertension in men (37.28% of the total number of men surveyed) was significantly higher than that in women (17.31%), which might be related to men's long-term exposure to smoking, drinking, smoked food and other bad lifestyle as well as social pressure. The incidence rate of hypertension in urban residents (40.96% of the total number of urban residents surveyed) is significantly higher than that in rural residents (15.45% of the total number of rural residents surveyed), which might be related to the exposure to high salt and fat, sour and spicy eating habits

**Table 2.** Logistic regression analysis on the factors of hypertension in Hubei Province.

	B	S.E	Wald	P-value	OR	95% C.I.	
Constant	-2.672	0.203	25.104	0.006	0.004		
Age	0.743	0.037	33.529	0.017	1.983	1.578	2.319
Gender	0.481	0.054	16.031	0.003	1.427	0.943	1.792
Education level	0.252	0.027	14.824	0.011	1.152	0.723	1.682
Dieting habits (high salt and oil)	-0.378	0.035	9.572	0.017	2.071	1.736	2.531
monthly income per capital	0.173	0.054	8.237	0.024	1.526	0.853	1.861
BMI	0.362	0.073	11.054	0.012	1.104	0.784	1.416

of urban residents, lacking of exercise including psychological pressure from social competition. The results of Logistic regression analysis showed that different age, gender, education level, dieting habits (high salt and fat), monthly income per capital, BMI had statistical significance on the incidence of hypertension in urban and rural residents of Hubei Province. This was basically consistent with the research results of Zhang Qin [10], Li Shicong [11], Wu Jianqiao [12], You Simiao [13] and others. However, the survey found that smoking and drinking were not the main factors affecting the incidence of hypertension among the surveyed, which was different from the research results of some domestic scholars, probably related to the climate environment and long-term formed dieting habits in Hubei Province [14] [15] [16].

#### **4.2. The Incidence of Hypertension in Residents Represented Younger Trend**

The survey found that the incidence of hypertension in the 18 - 29 years old people reached 14.75%, and the residents' incidence of hypertension showed a significant trend of ladder rise and being younger. The incidence of hypertension in the 50 - 59 years old residents accounted for nearly 30%, which indicated that the annual increase in the incidence of hypertension had sounded the alarm. With the changes of age, weight gain, diet adjustment, lifestyle, exercise reduction and many other aspects, additionally the lack of health knowledge and awareness, the incidence of hypertension is yearly increasing [17] [18] [19] [20]. The researchers found that 343 hypertensive patients (84.07% of hypertensive patients) said it was difficult for them to control their emotions, quick exposure to excitement and anxiety once in trouble, and being emotional in work and life. Only 574 people (38.27% of the total respondents) expressed concerns about their health status, blood pressure monitoring and health knowledge; 417 urbaners (60.35% of the total respondents) concerned about their health, while only 157 rural residents (19.41% of the total respondents) concerned about their health. This showed the difference between the urban and rural in their access to health knowledge and level of health awareness; also suggested that health education required innovative paths and means, as well as continuous publicity and education.

In conclusion, the prevention and treatment of hypertension must be integrated with the local regional environment, population structure, socioeconomic characteristics and culture, focusing on strengthening the intervention of high salt and fat dieting habits, smoking, drinking and other bad lifestyle, monitoring the change of BMI, practising health education for the elderly and obese people in both urban and rural areas, to reduce people's exposure to the risk factors of hypertension [21] [22].

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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