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## Prevalence and distribution of hypertension and related risk factors in Jilin Province, China 2015

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18	Abstract
19	Objective: To investigate the prevalence and distribution of hypertension and its
20	associated factors in Jilin province in China.
21	Design: a cross-sectional study in four cities and four rural counties in the province as
22	part of a national China study.
23	Participants and setting: A total of 15206 participants aged 15 years old or older
24	selected using a stratified multistage random sampling method.
25	Main outcome measures: prevalence of hypertension.
26	Results: The prevalence of hypertension in Jilin province was found to be 24.7%.
27	Moreover, the prevalence of hypertension increased with age in both sexes, and was
28	higher in males than in females. Body mass index, smoking and alcohol drinking were
29	associated with the prevalence of hypertension. All these risk factors above are similar
30	compared with southern China, except smoking, which has no association with
31	hypertension prevalence in the South.
32	Conclusions: Age, sex, body mass index, smoking, and alcohol drinking are risk
33	factors of hypertension. Control of these related risk factors, especially smoking, may
34	be helpful in the treatment and management of hypertension in Jilin province.
35	
36	Strength and limitations of this study
37	This is a cross-sectional population-based study performed in four cities and four
38	rural counties in Jilin province.
39	A large sample of participants allowed for the subgroups of related factors for
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statistical analysis.

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The causality cannot be assumed between the risk factors and hypertension. Data relevant to physical activity, salt intake and blood lipids were not collected. Key words Prevalence, hypertension, epidemiology, China, Jilin province Introduction As highlighted in the recent World Health Organization report, cardiovascular disease (CVD) is at the top of the list of the four prioritized non-communicable diseases worldwide that require immediate global action plans for prevention and control[1]. Hypertension is among the leading cause of cardiovascular disease and deaths worldwide [2, 3]. It is estimated that the global economic burden related to hypertension could be as high as US\$ 370 billion [4]. In the People's Republic of China, the prevalence of hypertension has been increasing dramatically from 5.1% in 1959, 7.7% in 1979, 13.6% in 1991 to 18.8% in 2002 [5, 6]. Further, there is a disproportionately higher hypertension rate reported among people living in the northern region of China[7, 8]. The province of Jilin is located in the northeast of China, with a population of approximately 27.5 million according to the National Bureau of Statistics. As for other northern provinces, Jilin has a longer winter season in comparison with the southern China, and, limited by this environment, the lifestyle of the people is different from the other parts of the country. 3

An in-depth analysis of the survey results from Jilin province related to risk factors for hypertension will provide an opportunity to understand the differential reasons for hypertension in the North, and will assist in the development of effective intervention and control strategies for this preventable disease. The objectives of this study were: to estimate the prevalence of hypertension in Jilin province and to explore potential risk factors associated with hypertension in the province. This will provide information for making recommendations on the prevention and control of hypertension in the northern region of China. 

#### 71 Methods

#### 72 Study population

This cross-sectional study was conducted between July 2014 and December 2015. A 4-stage, stratified sampling method was used to select a representative sample of the general population age 15 years and older in Jilin province, China. First, four cities from the urban areas and four counties from rural areas were selected using probability proportional to size (PPS). Then two districts or two townships were selected in each city or county using simple random sampling (SRS). Next, in each district and township, three communities or villages were chosen respectively using SRS. Finally, participants stratified by sex (50% men and 50% women) and age (aged 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 65-74, 275 years) were chosen using SRS according to the national population composition. Participants were chosen from the list provided by the local government registers of households [9]. 

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Considering a design effect of 2.5 and assuming a prevalence of hypertension of 17.7% among the population aged 15 years and older, an estimated sample size of 15,200 participants was needed to ensure that the bound on the error of estimation (i.e. width of the 95% confidence interval (CI)) for the prevalence in the entire population and subpopulation defined by age and sex were less than 0.4% and 1.8%, respectively [9]. As a result, a total of 15,206 participants living in Jilin province over 6 months and aged 15 years and older were randomly selected to participate in the survey.

92 Measurement

A questionnaire interview and physical examination were conducted in the survey. The standardized questionnaire was developed by the national coordinating center of the Fuwai Hospital (Beijing, China) and included questions on demographic, health behaviors and physical activities. The questionnaire was completed by the participants in a face-to-face interview with trained staff.

The physical examination included blood pressure (BP), body weight and height. BP was measured on the right arm supported at the heart level after participants rested for five minutes, using the Omron HBP-1300 Professional Portable Blood Pressure Monitor (OMRON, Japan). BP was measured three times, with 30 seconds between each measurement. The average of three readings was used for further analysis [10]. Body weight without heavy clothing, basal metabolism (BM), body fat percentage (BFP) and visceral fat index (VFI) were measured using an OMRON body fat and weight measurement device (Vbody HBF-371, OMRON, Japan). Height was 

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measured without shoes using a standard right-angle device and a fixed measurementtape (to the nearest 0.5 cm).

#### **Definitions**

Hypertension was defined as systolic BP (SBP) $\geq$ 140mmHg or diastolic BP (DBP) $\geq$ 90mmHg, or self-reported use of antihypertensive medication [11]. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Overweight was defined as BMI 25-30kg/m<sup>2</sup>, and obesity was defined as BMI $\geq$ 30kg/m<sup>2</sup>.

#### 116 Statistical analysis

Data was entered and validated using Epidata<sup>®</sup> 3.0 software[12]. All estimates and analyses were weighted to represent the population in Jilin Province aged 15 years or older. The weights were calculated based on the 2010 Jilin province population census data, and the sampling age, sex and geographic subgroups were taken into account. Continuous data were presented as mean  $\pm$  standard deviation (SD) or mean with 95% confidence intervals (CI), and differences between groups were compared using the t-est. Categorical data were presented as frequency, rate and 95% CI, and the prevalence between different groups was compared using the corrected Rao-Scott chi-square test. Logistic regression analysis was conducted assessing the relationship of age, sex, obesity, smoking, and alcohol drinking for hypertension adjusted for demographic factors, that have been included in similar studies, including 

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sex, region, age, education level, employment status, marital status, BMI, and family history of hypertension. All analyses were conducted using SPSS<sup>®</sup> 18.0 software[13]. Results **Distribution of participants** A total of 14,956 participants from 15,206 eligible participants (6,946 males and 8,010 females; aged 15–97 years) completed the survey and were included in the statistical analysis. The non-responders (1.6%) were mainly young people with nonresponse likely related to their busy work schedule. The average age of the participants was 45.5 years, with the average age for males being 45.6±19.6 years and for females 45.5±18.9 years. There was no statistically significant difference in age between the sexes (p=0.92). The distribution of participants by age and sex are shown in Table 1 and Figure 1. **Characteristics of participants** The BMI of the participants was  $24.01\pm3.67$  kg/m<sup>2</sup>, BM was (1397.47 $\pm244.15$ ), BFP was 26.20±8.4 and VFI was 8.54±4.99. The SBP of the participants was 128.92±17.97) mmHg, and the DBP was 76.81±10.36 mmHg. These physical characteristics by age and sex are shown in Supplementary Table 1. All these characters were statistically significantly different between males and females (p<0.01). In particular, BM and VFI for males was higher than for females in all age groups (Figure 2A and 2B), while BFP for females was higher than males in all age 

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groups (Figure 2C). BMI reached its highest value for males in the 35-44 year age
group and for females in the 55-66 year age group (Figure 2D). The SBP was similar
between males and females in all age groups (Figure 2E), yet the DBP of males was
higher than for female in all age groups (Figure 2F).

#### 155 Lifestyle risk factors - obesity, smoking and alcohol drinking

The prevalence of overweight and obesity of participants was 29.8% and 6.2%, respectively. The prevalence of overweight for the male participants was 30.9%, higher than for the female participants at 28.7% (p=0.013). On the other hand, there was no statistical difference between the prevalence of obesity of male participants (6.3%) and female participants (6.2%) (p=0.78). The percentage of current smoking and ever smoking was 22.7% and 1.4%, respectively. When stratified by sex, the percentage of current smoking in males (36.9%) was higher than in females (8.2%) (p<0.001). Similarly, the percentage of ever smoking in males (2.3%) was higher than that in females (0.5%) (p<0.001). The percentage of alcohol drinking was 17.6%. The percentage in males (32.0%) was significantly higher than in females (2.9%) (p<0.001). The risk factors BMI, smoking and alcohol drinking, summarized by age and sex, are shown in Table 2.

#### **Prevalence of hypertension stratified by age and sex**

170 Of the 14,956 participants, 4,332 were diagnosed with hypertension, and the 171 prevalence of hypertension was 24.7% (95% CI: 23.9%, 25.5%). The prevalence of

hypertension was larger for the older age groups, and was higher in males (25.6%) than in females (23.8%) (p=0.03). For each age group less than 45 years, the prevalence of hypertension in males was higher than in females (p<0.001); while for the 65-74 year age group, the prevalence of hypertension in females was higher than in males (p=0.04); and in the other age groups, the prevalence of hypertension in males and females showed no statistical difference (p>0.05). The prevalence of hypertension stratified by age and sex is shown in Table 3.

#### 180 Prevalence of hypertension stratified by obesity, smoking and alcohol drinking

The prevalence of hypertension was statistically different across BMI categories (p<0.001); the highest prevalence being reported was 48.1% in the obese group, followed by the overweight group at 35.7%. When stratified by smoking, the prevalence of hypertension also showed statistical differences between the current smoking, ever smoking, and never smoking groups (p<0.001); with the highest prevalence of 53.1% in the ever smoking group, followed by 32.2% in the current smoking group and 22.0% in the never smoking group. The prevalence of hypertension in the alcohol drinking group was 34.6%, higher than 22.6% in the no-alcohol drinking group (p < 0.001). The prevalence of hypertension stratified by BMI, smoking and alcohol drinking are shown in Table 4.

192 Factors associated with hypertension

Several factors, including age, sex, obesity, smoking, and alcohol drinking, are

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194	associated with the prevalence of hypertension, both in the crude model and adjusted
195	logistic model. In particular, in the absence of adjusting for other factors, the
196	univariate logistic model indicated that the risk of hypertension was greater in males
197	with an OR=1.1 (95% CI: 1.01, 1.2) than in females, overweight partipants with an
198	OR=2.52 (95% CI: 2.3, 2.77) than in normal participants, obese participants with an
199	OR=4.21 (95% CI: 3.56, 4.96) than in normal participants, smokers with OR=1.64
200	(95% CI: 1.48, 1.81) than in non-smokers, and alcohol drinkers with OR=1.81 (95%
201	CI: 1.62, 2.02) than in non-alcohol drinkers. All the difference were statistically
202	significant (p<0.05). A multivariable logistic regression model was used to adjust for
203	potential influencing factors. After adjustment for age, sex, region, education level,
204	employment status, BMI, family history of hypertension, and marital status that may
205	affect hypertension, the risk of hypertension was greater in males with an adjusted
206	OR=1.26 (95% CI:1.13, 1.39) than in females, in overweigh participants with an
207	adjusted OR=2.3 (95% CI: 2.06, 2.58) than in normal participants, in obese
208	participants with an adjusted OR=5.11 (95% CI: 4.16, 6.27) than in normal
209	participants, in smokers with an adjusted OR=1.28 (95% CI: 1.13, 1.46) than in
210	non-smokers, and in alcohol drinkers with an adjusted OR=1.49 (95% CI: 1.28, 1.73).
211	These results are shown in Table 5.

213 Discussion

With the estimated prevalence of hypertension in Jilin province of 24.7%, a population of approximately 6.8 million in the province are hypertensive. At the

216	national level, the prevalence of hypertension in Jilin is comparable to that in
217	Zhejiang province [12]; while the prevalence is lower than in other regions in China,
218	including Jiangxi [13], Inner Mongolia [14], and Macau [15], as well as, lower than
219	the overall prevalence in China [16]. Worldwide, this prevalence is lower than that in
220	the US, the UK, but is higher than that in Canada [4]. However, there are some
221	limitations in terms of the direct comparisons among these studies, given the varying
222	methods and environments and variations of population genetics.
223	Although the prevalence of 24.7% is lower than 30.8% that was found in 2012
224	[17], it is still not acceptable in terms of optimal hypertension health in the province.
225	Our study found that the prevalence of overweight and obesity was 29.8% and 6.2%,
226	respectively, which is higher than that reported at the national level of 17.7% and
227	5.6%, respectively[18]. Several studies have shown that obesity is a risk factor for the
228	development of hypertension[19-21]. Obesity can increase hypertension through
229	multiple mechanisms, including insulin resistance, activation of sympathetic nervous
230	system, sodium retention leading to increase in renal reabsorption, and activation of
231	the renin-angiotensin system[22]. The growing number of people with obesity and
232	being overweight in the province of Jilin presents a strong indicator of the potential
233	risk of future increasing incidence of hypertension. Unfortunately, this modifiable risk
234	factor has exhibited no change in between the report in 2012 and now[17], not to
235	mention that the population of overweight and obesity may have been underestimated,
236	since the standard definition of overweight and obesity used in our research may be
237	set too high for asian people[23, 24]. Moreover, some people may be abdominal obese

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with a normal BMI value (18.5-24.9kg/m<sup>2</sup>). Studies have reported that despite the normal BMI value, abdominal obesity is also a risk factor for hypertension worldwide[25, 26]. This modifiable risk factor deserves attention and requires an effective proactive intervention program to slow and ultimately reduce the number of individuals with obesity becoming hypertensive.

Our study found that the overall prevalence of hypertension increases with age in 243 244 both males and females, especially in the range of 35-74 years of age. This result supports the hypothesis that age is one of the risk factors of hypertension [27-30]. An 245 246 increasing lifespan among the population in Jilin requires that a practical and effective hypertension management strategy of intervention and control targeting the aging 247 population be devloped. The overall prevalence of hypertension is higher in males 248 249 than in females. However, the prevalence in females increased more rapidly than in 250 males aged 65-74 years. This may be partially explained by hormonal changes in post-menopausal women and the difference in lifespan between males and females [4, 251 31]. However, the exact mechanisms need to be explored. 252

253 Consistent with previous studies [32, 33], our study also showed that smoking, 254 both current and ever smoking, is associated with an increased risk of hypertension. 255 Smoking can increase blood viscosity, stimulate the adrenergic nervous system, and 256 contribute to the development of both micro- and macro-vascular diseases[34]. 257 Although some studies reported weak associations between smoking and hypertension 258 [13, 20], smoking is considered a major risk factor worldwide [13, 20, 35-37], 259 Additionally, drinking of alcohol is also a factor associated with increasing the risk of

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260	hypertension in our study, which is consistent with previous studies [4, 38-40]. These
261	results indicate that changes in living habits, including quitting smoking and alcohol
262	drinking, should help to reduce the prevalence of hypertension.
263	National studies reported that the prevalence of hypertension is higher in northern
264	China than that in southern China[7, 16]. When comparing the associations between
265	risk factors and hypertension with Zhejiang province located in the South[12], we
266	found that the risk of hypertension with demographic factors, such as age, sex, and
267	region, and clinical factors, such as family history of hypertension and abdominal
268	waist circumference, were similar in Jilin province and in southern China. When it
269	comes to the lifestyle factors, the risk of hypertension with obesity and alcohol
270	drinking were similar, however, there was a marked difference in the modifiable risk
271	factor smoking; in particular, in Jilin province there was a strong association with an
272	adjusted OR=1.28 (95% CI: 1.13, 1.46), whereas no association between smoking and
273	hypertension in southern China was found, with an adjusted OR=1.0 (95% CI: 0.9,
274	1.1). These findings indicate that programs aimed at reducing smoking would be an
275	important step to mitigate the prevalence of hypertension in Jilin province. Some
276	social factors including retirement status, marital status, and educationan level were
277	also different between the North and the South. Of interest, there was a difference on
278	BFP categories. In particular, for category 10-19 for males and 20-29 for females,
279	there was no association between BFP and hypertension in Jilin province with an
280	adjusted OR=0.95 (95%CI: 0.71, 1.27), whereas in this category BFP is protective
281	againt hypertension in south China with an adjusted OR=0.6 (95% CI: 0.5, 0.8). In the

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282	range of over 25 for males and over 35 for females, BFP is strongly associated with
283	hypertension in Jilin province with an adjusted OR=1.45 (95% CI: 1.07, 1.96),
284	whereas no association was found in the South with an adjusted OR=1.3 (95%CI: 1.0,
285	1.5). These results indicate that BFP tends to be more of a risk for hypertension in the
286	North compared to the South. Studies have reported that high BFP increase blood
287	pressure[41, 42]. There are also studies reporting that the relationship between BFP
288	and BMI may be different in different ethnic groups[43], and the latter is already
289	known to be a risk factor for hypertension. These studies provide inside of the
290	different role BFP has on hypertension in the northern and southern China. Further
291	studies on the relationship between BFP and hypertension need to be done.
292	A survey in 2012 found a prevalence of hypertension of 30.8% [17]. The
293	prevalence of hypertension in our study was lower. This reduction may be related to
294	the following two factors. First, the government of Jilin province is aware of the
295	damage and burdern of hypertension and is dedicated to increase the funding of
296	medical insurance, especially for rural residents, from RMB ¥3.9 billion in 2012 to
297	RMB ¥6.4 billion, according to the statistical bureau of Jilin province. Second, new
298	hypertension guidelines on grass-roots management of hypertension[44] and patient
299	education[45] have been published in China since 2012. However, some key
300	modifiable risk factors have exhibited slight negative changes, in particular, the trend
301	towards obesity, drinking and smoking. This can be due in part to the evolving
302	economy of Jilin province with the gross domestic product increasing from RMB
303	¥361.5 billion in 2015, to RMB ¥857.8 billion in 2010, to RMB ¥1.4 trillion in 2015,
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according to the statistical bureau of Jilin province. To reverse these trends will require an effective and workable intervention program to control hypertension by incorporating best practices identified in theory and practice. For example, rates of hypertension awareness have greatly improved from 24.4% to 42.6%, treatment from 20.0% to 24.2% based on national surveys [16]. However, the control rate is only 9.3% in comparison with 53% in the USA[4]. One of the challenges is to improve adherence to anti-hypertension drugs. There are some limitations in this study. First, this is a cross-sectional study design, thus the causality cannot be assumed between the risk factors and hypertension. Second, due to limited financial resource, data relevant to physical activity, salt intake and blood lipids were not collected. Third, the decrease of prevalence of hypertension in our study compared with that in 2012 may be related with sampling factor. In summary, the prevalence of hypertension in Jilin province decreased compared with that in 2012, and is lower than the overall prevalence in China. In addition, the study showed that hypertension is associated with age, sex, obesity, smoking and alcohol drinking. In particular, smoking seemed to be responsible for the different prevalence of hypertension in northern and southern China. These factors above, especially smoking, might be important points to control and manage hypertension in Jilin province. 

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8 9	463	
10	464	Footnotes
11	464	Footnotes
12 13	465	Contributors
14	466	BL is involved in the design, JW, XS, LL, YY, YL, and CQ collected the data, YZ
15	400	
16 17	467	and YL performed the statistical analysis, TL, WS, and BL wrote the paper. All
18	468	authors reviewed and approved the final version of the paper.
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20	469	
21 22	470	Ethics approval
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24	471	This study was approved by the Fuwai Hospital Ethics Review Board.
25	472	
26 27	470	End the s
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33 34	470	reemology and the National Chinear Rey Specialty Hojeet.
35	477	
36	478	Competing interests
37		
38 39	479	None declared.
40	480	Data sharing statement
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42 43	481	Data sharing statement
44	482	No additional data are available.
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### 483 Figure Captions

**Figure 1:** Population pyramid by age and sex of participants in Jilin province

486 Figure 2: Trends of physical characteristics by age and sex. (A) basal metabolism BM

487 (B) body fat percentage - BFP (C) visceral fat index - VFI (D) body mass index - BMI

488 (E) systolic blood pressure - SBP (F) diastolic blood pressure - DBP

**Table 1:** Distribution of participants by age and sex in Jilin province (N, %)

1 99	Mal	le	Fen	nale	Total		
Age	N	%	Ν	%	Ν	%	
15-24	1120	9.07	1146	8.51	2266	17.59	
25-34	1316	8.91	1520	8.52	2836	17.43	
35-44	1084	11.95	1359	11.40	2443	23.35	
45-54	1043	10.02	1333	9.68	2376	19.70	
55-64	950	6.36	1121	6.47	2071	12.83	
65-74	755	3.01	823	3.23	1578	6.24	
75+	678	1.31	708	1.55	1386	2.86	
Total	6946	50.63	8010	49.37	14956	100.0	

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		BN	ΛI			Smoking		Alcohol Drinkin
	<18.5	18.5-25.0	25.0-30.0	>30.0	Current	Ever	Never	
Male								
15-24	13.33	67.57	14.85	4.25	6.95	0.36	92.69	5.80
	(11.11,15.91)	(64.24,70.73)	(12.58,17.46)	(3.03,5.93)	(5.47,8.80)	(0.10,1.22)	(90.79,94.22)	(4.62, 7.26)
25-34	2.80	57.76	31.36	8.08	39.19	0.64	60.17	29.70
	(1.98,3.93)	(54.70,60.77)	(28.57,34.30)	(6.52,9.96)	(36.20,42.26)	(0.30,1.37)	(57.09,63.17)	(26.96, 32.60)
35-44	1.89	54.86	35.26	7.99	46.92	1.32	51.76	39.90
	(0.18,3.01)	(51.49,58.18)	(32.10,38.55)	(6.35,10.02)	(43.57,50.30)	(0.79,2.18)	(48.39,55.12)	(36.62, 43.26)
45-54	1.56	55.63	36.25	6.56	48.42	3.19	48.38	44.70
	(0.93,2.60)	(52.33,58.88)	(33.14,39.47)	(5.11,8.39)	(45.13,51.73)	(2.25,4.52)	(45.10,51.68)	(41.44, 48.00)
55-64	0.79	59.10	35.17	4.94	44.79	5.19	50.02	39.30
	(0.39,1.60)	(55.67,62.44)	(31.96,38.52)	(3.65,6.66)	(41.38,48.25)	(3.88,6.91)	(46.57,53.47)	(35.99, 42.71)
65-74	2.16	60.45	33.51	3.88	32.13	6.99	60.88	34.30
	(1.26,3.69)	(56.54,64.22)	(29.91,37.33)	(2.66,5.62)	(28.57,35.91)	(5.22,9.30)	(56.97,64.65)	(30.65, 38.14)
75+	3.71	62.83	30.22	3.23	22.06	5.58	72.35	18.74
	(2.53,5.42)	(58.82,66.68)	(26.61,34.10)	(2.01,5.15)	(18.85,25.64)	(3.96,7.82)	(68.54,75.87)	(15.72, 22.19)
Female								
15-24	13.46	70.77	12.55	3.22	0.36	0.00	99.64	0.76
	(11.24,16.03)	(67.48,73.85)	(10.34,15.16)	(2.34,4.43)	(0.11,1.16)		(98.84,99.89)	(0.43,1.35)
25-34	6.46	66.10	22.33	5.11	2.90	0.06	97.04	3.50
	(5.25,7.94)	(63.37,68.72)	(20.06,24.79)	(3.97,6.55)	(2.05,4.08)	(0.01,0.44)	(95.85,97.89)	(2.65,4.62)
35-44	1.81	61.59	29.86	6.74	8.00	0.07	91.93	4.40
	(1.16,2.81)	(58.64,64.45)	(27.18,32.67)	(5.38,8.41)	(6.45,9.88)	(0.01,0.50)	(90.05,93.49)	(3.37,5.73)

Table 2: Distribution of participants by age and sex stratified by body mass index, smoking and alcoholic drinking in Jilin province (%, 95%CI) 492

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45-54	1.99	54.20	36.38	7.44	10.36	0.52	89.12	3.08
	(1.29,3.04)	(51.27,57.09)	(33.62,39.24)	(6.05,9.11)	(8.69,12.31)	(0.23,1.17)	(87.14,90.83)	(2.23,4.25)
55-64	2.53	48.89	40.24	8.34	16.81	1.46	81.73	2.53
	(1.72,3.71)	(45.72,52.08)	(37.17,43.39)	(6.72,10.30)	(14.58,19.30)	(0.85,2.49)	(79.16,84.05)	(1.68,3.81)
65-74	4.89	50.05	38.50	6.57	17.61	1.68	80.71	1.81
	(3.53,6.72)	(46.31,53.78)	(34.91,42.22)	(4.94,8.67)	(14.97,20.60)	(0.93,2.99)	(77.62,83.47)	(1.03,3.16)
75+	10.17	57.46	26.17	6.20	12.82	1.27	85.91	2.48
	(7.87,13.04)	(53.37,61.45)	(22.77,29.89)	(4.50,8.50)	(10.29,15.87)	(0.64,2.50)	(82.77,88.55)	(1.45,4.23)

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	Age		Male		Female		Total
	group	n	CR(95%CI)	n	CR(95%CI)	n	CR(95%CI)
-	15-24	80	6.86(5.27,8.87)	23	1.88(1.19,2.96)	103	4.45(3.53,5.59)
	25-34	106	8.47(6.89,10.36)	50	4.28(3.20,5.69)	156	6.42(5.43,7.58)
	35-44	221	21.00(18.36,23.91)	195	15.21(13.14,17.55)	416	18.17(16.45,20.0
	45-54	379	35.13(32.06,38.33)	430	32.57(29.89,35.36)	809	33.87(31.82,35.9
	55-64	449	46.42(43.00,49.87)	576	50.72(47.54,53.90)	1025	48.59(46.25,50.9
	65-74	451	59.91(55.98,63.71)	518	65.32(61.72,68.76)	969	62.71(60.06,65.2
	75+	405	61.24(57.24,65.10)	449	62.37(58.30,66.28)	854	61.86(59.00,64.6
494	CI: confi	idence in	nterval				
495							

		Bl	II			Smoking	Alcohol Drinking		
	<18.5	18.5-25.0	25.0-30.0	>30.0	Current	Ever	Never	Yes	No
Male									
15-24	1.48	4.39	16.22	30.17	8.17	13.13	6.73	11.60	6.56
	(0.37,5.76)	(2.94,6.51)	(10.62,24.00)	(16.58,48.44)	(3.45,18.15)	(1.35,62.57)	(5.10,8.84)	(5.85,21.69)	(4.95, 8.66)
25-34	1.45	5.33	9.15	30.70	11.49	6.89	6.51	10.64	7.55
	(0.20,9.72)	(3.78,7.46)	(6.43,12.85)	(21.42,41.86)	(8.66,15.08)	(0.88,38.13)	(4.80,8.78)	(7.63, 14.64)	(5.80, 9.77)
35-44	5.49	14.76	25.87	45.98	23.76	36.23	18.11	28.02	16.34
	(0.97,25.57)	(11.77,18.34)	(21.16,31.22)	(34.53,57.87)	(19.72,28.33)	(16.51,62.01)	(14.77,22.00)	(23.40, 33.16)	(13.35,19.84
45-54	27.39	25.02	44.90	68.73	37.10	41.53	32.74	43.01	28.76
	(10.96,53.63)	(21.38,29.05)	(39.57,50.35)	(55.83,79.27)	(32.60,41.83)	(25.83,59.16)	(28.51,37.27)	(38.20, 47.96)	(24.95, 32.9
55-64	11.46	39.64	55.87	65.91	47.15	61.46	44.21	52.10	42.74
	(2.44,40.14)	(35.33,44.11)	(50.07,79.30)	(50.62,78.48)	(42.04,52.33)	(46.39,74.61)	(39.43,49.09)	(46.61, 57.54)	(38.42, 47.1
65-74	19.58	52.27	73.86	80.86	60.60	74.69	57.84	66.86	56.58
	(6.35,46.63)	(47.16,57.34)	(67.56,15.96)	(61.30,91.85)	(53.60,67.20)	(59.79,85.42)	(52.78,62.74)	(60.21, 72.89)	(51.40, 61.0
75+	37.87	58.85	66.71	83.47	68.66	59.10	59.15	65.17	60.34
	(21.57,57.45)	(53.77,63.76)	(59.34,73.34)	(57.75,94.91)	(60.13,76.08)	(41.42,74.69)	(54.42,63.71)	(55.63, 73.63)	(55.90, 64.6
Female									
15-24	1.50	0.91	5.62	10.02	0.00	0.00	1.88	0.00	1.89
	(0.37,5.81)	(0.42,1.98)	(2.53,12.01)	(3.85,23.67)			(1.19,2.97)		(1.19,2.98)
25-34	0.00	2.16	6.56	27.09	12.35	0.00	4.04	0.66	4.41
		(1.29,3.59)	(4.03,10.51)	(16.97,40.31)	(4.36,30.33)		(2.98,5.44)	(0.09,4.63)	(3.29,5.87
35-44	17.78	9.70	22.05	34.59	19.76	100.00	14.75	25.47	14.74
	(5.86,42.90)	(7.67,12.20)	(17.69,27.14)	(24.35,46.49)	(12.41,29.97)	(100.00, 100.00)	(12.62,17.17)	(14.99,39.84)	(12.65,17.1

tratified by body 1... d alashalia drinking (0/ 050/CI) Table 4 D f l in d. 

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45-54	0.00	24.68	40.48	60.03	34.92	61.78	32.13	27.45	32.73	
	0.00	(21.42,28.27)	(35.84,45.30)	(49.33,69.86)	(26.73,44.12)	(22.45,90.03)	(29.31,35.08)	(15.31,44.19)	(30.01,35.57)	
55-64	40.61	39.07	61.42	70.47	51.28	62.47	50.40	51.62	50.70	
	(23.68,60.12)	(34.71,43.61)		(59.27,79.64)	(43.64,58.86)	(35.28,83.56)	(46.87,53.92)	(31.60,71.13)	(47.48,53.91)	
65-74		59.74	74.83	72.04	65.26	57.48	65.50	50.45	65.60	
	(24.16,55.33)	(54.53,64.73)	(60 27 70 68)	(57 14 83 28)	(56 45 73 13)	(20 24 81 56)	(61 / 8 60 31)	(24.78,75.88)	(61.97,69.05)	
75+	45.30	60.64	73.24	60.53	64.01	100.00	61.57	51.72	62.64	
	(32.73,58.49)	(55.25,65.79)	(65.79,79.57)	(43.53,75.31)	(52.10,74.41)	(100.00,100.00)	(57.18,65.79)	(26.49,76.10)	(58.53,66.58)	
						(25.24,31.50) 100.00 (100.00,100.00)				
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#### Table.5 Risk factors associated with the prevalence of hypertension 497

	Hypertensic	on prevalence
	Unadjusted	Adjusted
Age(Ref: 15-24)		
25-34	1.47(1.09,1.99)	1.05(0.71,1.55)
35-44	4.77(3.65,6.24)	2.83(1.90,4.22)
45-54	11.01(8.51,14.24)	6.93(4.69,10.24
55-64	20.31(15.69,26.29)	13.43(9.06,19.9
65-74	36.14(27.73,47.11)	26.18(17.56,39.
75+	34.85(26.65,45.57)	29.89(19.83,45.
Sex(Ref: female)	1.1(1.01,1.2)	1.25(1.13,1.39)
Region(Ref: Urban)	1.19(1.09,1.3)	1.25(1.12,1.39)
Race(Ref: Han)	1.15(0.93,1.42)	0.93(0.74,1.18)
Employment(Ref: be employed)		
Retired	2.67(2.22,3.2)	0.67(0.53,0.85)
Student	0.15(0.11,0.21)	1.09(0.71,1.70)
Unemployed	1.18(1.07,1.3)	0.84(0.74,0.95)
Marital(Ref: married)	0.72(0.63,0.83)	1.29(1.00,1.65)
Education level(Ref: college or high	ner)	
Illiterate	6.69(5.19,8.63)	2.18(1.62,2.93)
Primary	3.26(2.7,3.93)	1.98(1.60,2.44)
Middle	1.55(1.24,1.94)	1.24(0.97,1.57)
BMI(Ref: Normal)		
Overweight	2.22(2.01,2.46)	2.30(2.06,2.57)
Obese	3.96(3.31,4.75)	5.17(4.20,6.37)
AWC(Ref:<90M,<85F)		
≥90M, ≥85F	1.41(1.23,1.62)	1.35(1.16,1.57)
≥95M, ≥90F	1.5(1.32,1.72)	1.68(1.43,1.96)
Family history of hypertension	1.74(1.55,1.96)	2.35(2.06,2.67)
Family history of stroke	1.33(0.85,2.06)	1.79(1.09,2.92)
Family history of CAD	3.18(2.64,3.83)	1.65(1.33,2.03)
Smoker(Ref: no)	1.37(1.23,1.53)	1.23(1.08,1.40)
Drinker(Ref: no)	1.56(1.38,1.77)	1.47(1.27,1.71)
VAI (Ref:<10)		
10~14	1.6(1.41,1.8)	1.40(1.22,1.60)
15~30	2.69(2.29,3.16)	2.05(1.69,2.49)
BFP(Ref:<10M, <20F)		· · · /
10~19M, 20~29F	1.31(1,1.71)	0.95(0.71,1.27)
20~24M, 30~34F	2.72(2.09,3.55)	1.24(0.92,1.66)
20 2111, 50 511	× / /	. , ,

498 CAD:

499 coronary heart disease; M: male; F: female; VAI: Visceral Fat; BFP: body fat percentage.

500 Adjusted for sex, region, age, education level, employment status, marital status, BMI, and family

501 history of hypertension

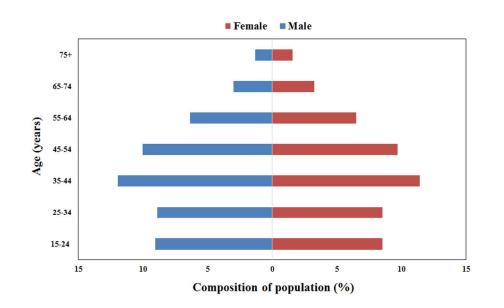
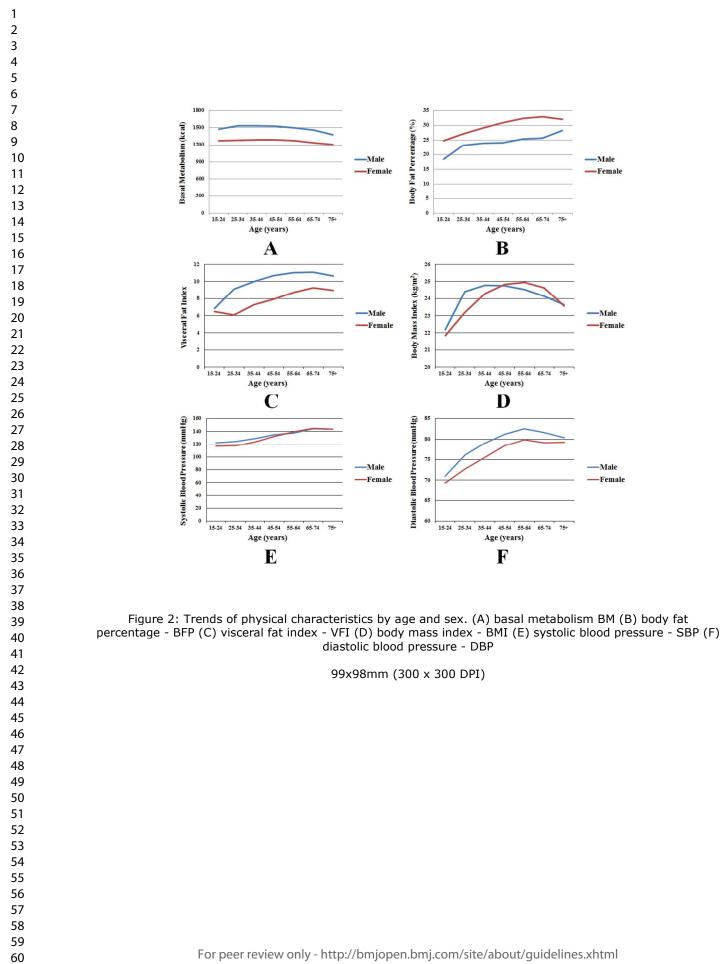


Figure 1: Population pyramid by age and sex of participants in Jilin province

83x58mm (300 x 300 DPI)

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			Male		Female
	Age	Mean	95%CI	Mean	95%CI
BM	Total	1511.50	(1504.56,	1280.52	(1276.09, 1284.96
			1518.43)		
	15-24	1478.92	(1456.95,	1279.31	(1264.09, 1294.53
			1500.88)		
	25-34	1538.93	(1524.04,	1281.66	(1272.68,1290.64
			1553.81)		
	35-44	1534.48	(1519.02,	1293.35	(1284.03, 1302.67
			1549.95)		
	45-54	1528.84	(1514.65,	1293.81	(1284.74, 1302.87
			1543.02)		
	55-64	1499.65	(1486.40,	1274.36	(1264.67, 1284.06
			1512.90)		
	65-74	1460.36	(1443.82,	1241.86	(1230.00, 1253.73
			1476.89)		
	75+	1382.81	(1367.17,	1209.84	(1195.08, 1224.59
			1398.45)		<b>`</b>
Body Fat	Total	23.28	(23.03, 23.53)	29.19	(29.02, 29.35)
percentage					
	15-24	18.46	(17.52, 19.40)	24.78	(24.38, 25.18)
	25-34	23.26	(22.87, 23.65)	27.20	(26.88,27.52)
	35-44	24.02	(23.64, 24.40)	29.19	(28.86, 29.52)
	45-54	24.09	(23.76, 24.41)	30.95	(30.61, 31.29)
	55-64	25.34	(24.58, 26.10)	32.39	(31.99, 32.80)
	65-74	25.74	(25.30, 26.17)	32.97	(32.46, 33.48)
	75+	28.31	(27.06, 29.56)	32.08	(31.15, 33.00)
VAI	Total	9.63	(9.49, 9.77)	7.42	(7.29, 7.55)
	15-24	6.81	(6.54, 7.08)	6.48	(6.05, 6.91)
	25-34	9.13	(8.81, 9.46)	6.07	(5.83, 6.30)
	35-44	10.01	(9.70, 10.32)	7.25	(6.96, 7.54)
	45-54	10.71	(10.39, 11.03)	7.90	(7.68, 8.11)
	55-64	11.06	(10.74, 11.37)	8.71	(8.47, 8.96)
	65-74	11.11	(10.72, 11.49)	9.27	(8.81, 9.73)
	75+	10.64	(10.21, 11.07)	8.95	(8.56, 9.35)
BMI	Total	24.15	(24.05,24.25)	23.88	(23.78,23.97)
	15-24	22.20	(21.93,22.47)	21.86	(21.63,22.10)
	25-34	24.41	(24.18,24.63)	23.20	(22.99,23.42)
	35-44	24.78	(24.55,25.01)	24.29	(24.08,24.51)
	45-54	24.75	(24.54,25.01)	24.82	(24.63,25.02)
	55-64	24.54	(24.33,24.76)	24.96	(24.74,25.18)

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**Supplementary Table** Descriptions of basal metabolism – BM, body fat percentage – BFP, visceral fat index - VFI by age and sex in Jilin province

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15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$						
SBP         Total         130.44         (129.99,130.88)         127.36         (126.90,127.81)           15-24         122.45         (121.67,123.24)         116.81         (116.13,117.50)           25-34         124.43         (123.77,125.08)         117.93         (117.28,118.58)           35-44         128.76         (127.85,129.67)         123.85         (122.95,124.75)           45-54         134.69         (133.51,135.87)         132.39         (131.28,133.49)           55-64         137.56         (136.22,138.91)         139.53         (138.17,140.90)           65-74         143.98         (142.25,145.71)         145.16         (143.55,146.76)           75+         143.69         (141.96,145.42)         143.44         (141.60,145.28)           DBP         Total         78.14         (77.84,78.43)         75.45         (75.19,75.71)           15-24         70.98         (70.43,71.53)         69.35         (68.82,69.88)           25-34         76.13         (75.63,76.63)         72.69         (72.25,73.13)           35-44         79.04         (78.42,79.66)         75.47         (74.91,76.03)           45-54         81.24         (80.51,81.96)         78.41         (77.79,79.03) <t< td=""><td>SBP         Total         130.44         (129.99,130.88)         127.36         (126.90,127.81)           15-24         122.45         (121.67,123.24)         116.81         (116.13,117.50)           25-34         124.43         (123.77,125.08)         117.93         (117.28,118.58)           35-44         128.76         (127.85,129.67)         123.85         (122.95,124.75)           45-54         134.69         (133.51,135.87)         132.39         (131.28,133.49)           55-64         137.56         (136.22,138.91)         139.53         (138.17,140.90)           65-74         143.98         (142.25,145.71)         145.16         (143.55,146.76)           75+         143.69         (141.96,145.42)         143.44         (141.60,145.28)           DBP         Total         78.14         (77.84,78.43)         75.45         (75.19,75.71)           15-24         70.98         (70.43,71.53)         69.35         (68.82,69.88)           25-34         76.13         (75.63,76.63)         72.69         (72.25,73.13)           35-44         79.04         (78.42,79.66)         75.47         (74.91,76.03)           45-54         81.24         (80.51,81.96)         78.41         (77.79,79.03)      <t< td=""><td>SBP         Total         130.44         (129.99,130.88)         127.36         (126.90,127.81)           15-24         122.45         (121.67,123.24)         116.81         (116.13,117.50)           25-34         124.43         (123.77,125.08)         117.93         (117.28,118.58)           35-44         128.76         (127.85,129.67)         123.85         (122.95,124.75)           45-54         134.69         (133.51,135.87)         132.39         (131.28,133.49)           55-64         137.56         (136.22,138.91)         139.53         (138.17,140.90)           65-74         143.98         (142.25,145.71)         145.16         (143.55,146.76)           75+         143.69         (141.96,145.42)         143.44         (141.60,145.28)           DBP         Total         78.14         (77.84,78.43)         75.45         (75.19,75.71)           15-24         70.98         (70.43,71.53)         69.35         (68.82,69.88)           25-34         76.13         (75.63,76.63)         72.69         (72.25,73.13)           35-44         79.04         (78.42,79.66)         75.47         (74.91,76.03)           45-54         81.24         (80.51,81.96)         78.41         (77.79,79.03)      <t< td=""><td>SBP       Total       130.44       (129.99,130.88)       127.36       (126.90,127.81)         15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)</td><td></td><td>65-74</td><td>24.14</td><td>(23.88,24.40)</td><td>24.63</td><td>(24.35,24.92)</td></t<></td></t<></td></t<>	SBP         Total         130.44         (129.99,130.88)         127.36         (126.90,127.81)           15-24         122.45         (121.67,123.24)         116.81         (116.13,117.50)           25-34         124.43         (123.77,125.08)         117.93         (117.28,118.58)           35-44         128.76         (127.85,129.67)         123.85         (122.95,124.75)           45-54         134.69         (133.51,135.87)         132.39         (131.28,133.49)           55-64         137.56         (136.22,138.91)         139.53         (138.17,140.90)           65-74         143.98         (142.25,145.71)         145.16         (143.55,146.76)           75+         143.69         (141.96,145.42)         143.44         (141.60,145.28)           DBP         Total         78.14         (77.84,78.43)         75.45         (75.19,75.71)           15-24         70.98         (70.43,71.53)         69.35         (68.82,69.88)           25-34         76.13         (75.63,76.63)         72.69         (72.25,73.13)           35-44         79.04         (78.42,79.66)         75.47         (74.91,76.03)           45-54         81.24         (80.51,81.96)         78.41         (77.79,79.03) <t< td=""><td>SBP         Total         130.44         (129.99,130.88)         127.36         (126.90,127.81)           15-24         122.45         (121.67,123.24)         116.81         (116.13,117.50)           25-34         124.43         (123.77,125.08)         117.93         (117.28,118.58)           35-44         128.76         (127.85,129.67)         123.85         (122.95,124.75)           45-54         134.69         (133.51,135.87)         132.39         (131.28,133.49)           55-64         137.56         (136.22,138.91)         139.53         (138.17,140.90)           65-74         143.98         (142.25,145.71)         145.16         (143.55,146.76)           75+         143.69         (141.96,145.42)         143.44         (141.60,145.28)           DBP         Total         78.14         (77.84,78.43)         75.45         (75.19,75.71)           15-24         70.98         (70.43,71.53)         69.35         (68.82,69.88)           25-34         76.13         (75.63,76.63)         72.69         (72.25,73.13)           35-44         79.04         (78.42,79.66)         75.47         (74.91,76.03)           45-54         81.24         (80.51,81.96)         78.41         (77.79,79.03)      <t< td=""><td>SBP       Total       130.44       (129.99,130.88)       127.36       (126.90,127.81)         15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)</td><td></td><td>65-74</td><td>24.14</td><td>(23.88,24.40)</td><td>24.63</td><td>(24.35,24.92)</td></t<></td></t<>	SBP         Total         130.44         (129.99,130.88)         127.36         (126.90,127.81)           15-24         122.45         (121.67,123.24)         116.81         (116.13,117.50)           25-34         124.43         (123.77,125.08)         117.93         (117.28,118.58)           35-44         128.76         (127.85,129.67)         123.85         (122.95,124.75)           45-54         134.69         (133.51,135.87)         132.39         (131.28,133.49)           55-64         137.56         (136.22,138.91)         139.53         (138.17,140.90)           65-74         143.98         (142.25,145.71)         145.16         (143.55,146.76)           75+         143.69         (141.96,145.42)         143.44         (141.60,145.28)           DBP         Total         78.14         (77.84,78.43)         75.45         (75.19,75.71)           15-24         70.98         (70.43,71.53)         69.35         (68.82,69.88)           25-34         76.13         (75.63,76.63)         72.69         (72.25,73.13)           35-44         79.04         (78.42,79.66)         75.47         (74.91,76.03)           45-54         81.24         (80.51,81.96)         78.41         (77.79,79.03) <t< td=""><td>SBP       Total       130.44       (129.99,130.88)       127.36       (126.90,127.81)         15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)</td><td></td><td>65-74</td><td>24.14</td><td>(23.88,24.40)</td><td>24.63</td><td>(24.35,24.92)</td></t<>	SBP       Total       130.44       (129.99,130.88)       127.36       (126.90,127.81)         15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)		65-74	24.14	(23.88,24.40)	24.63	(24.35,24.92)
15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)	15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)	15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)	15-24       122.45       (121.67,123.24)       116.81       (116.13,117.50)         25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.41,80.11)		75+	23.63	(23.37,23.89)	23.56	(23.24,23.88)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	25-34       124.43       (123.77,125.08)       117.93       (117.28,118.58)         35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	25-34 124.43 (123.77,125.08) 117.93 (117.28,118.58) 35-44 128.76 (127.85,129.67) 123.85 (122.95,124.75) 45-54 134.69 (133.51,135.87) 132.39 (131.28,133.49) 55-64 137.56 (136.22,138.91) 139.53 (138.17,140.90) 65-74 143.98 (142.25,145.71) 145.16 (143.55,146.76) 75+ 143.69 (141.96,145.42) 143.44 (141.60,145.28) DBP Total 78.14 (77.84,78.43) 75.45 (75.19,75.71) 15-24 70.98 (70.43,71.53) 69.35 (68.82,69.88) 25-34 76.13 (75.63,76.63) 72.69 (72.25,73.13) 35-44 79.04 (78.42,79.66) 75.47 (74.91,76.03) 45-54 81.24 (80.51,81.96) 78.41 (77.79,79.03) 55-64 82.50 (81.67,83.33) 79.87 (79.15,80.60) 65-74 81.56 (80.72,82.40) 79.13 (78.35,79.91) 75+ 80.38 (79.61,81.15) 79.26 (78.41,80.11) CI: confidence interval	SBP	Total	130.44	(129.99,130.88)	127.36	(126.90,127.81)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	35-44       128.76       (127.85,129.67)       123.85       (122.95,124.75)         45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)		15-24	122.45	(121.67,123.24)	116.81	(116.13,117.50)
45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	45-54       134.69       (133.51,135.87)       132.39       (131.28,133.49)         55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	45-54 134.69 (133.51,135.87) 132.39 (131.28,133.49) 55-64 137.56 (136.22,138.91) 139.53 (138.17,140.90) 65-74 143.98 (142.25,145.71) 145.16 (143.55,146.76) 75+ 143.69 (141.96,145.42) 143.44 (141.60,145.28) DBP Total 78.14 (77.84,78.43) 75.45 (75.19,75.71) 15-24 70.98 (70.43,71.53) 69.35 (68.82,69.88) 25-34 76.13 (75.63,76.63) 72.69 (72.25,73.13) 35-44 79.04 (78.42,79.66) 75.47 (74.91,76.03) 45-54 81.24 (80.51,81.96) 78.41 (77.79,79.03) 55-64 82,50 (81.67,83.33) 79.87 (79.15,80.60) 65-74 81.56 (80.72,82.40) 79.13 (78.35,79.91) 75+ 80.38 (79.61,81.15) 79.26 (78.41,80.11) CI: confidence interval		25-34	124.43	(123.77,125.08)	117.93	(117.28,118.58)
55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	55-64       137.56       (136.22,138.91)       139.53       (138.17,140.90)         65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)		35-44	128.76	(127.85,129.67)	123.85	(122.95,124.75)
65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	65-74       143.98       (142.25,145.71)       145.16       (143.55,146.76)         75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	65-74 143.98 (142.25,145.71) 145.16 (143.55,146.76) 75+ 143.69 (141.96,145.42) 143.44 (141.60,145.28) DBP Total 78.14 (77.84,78.43) 75.45 (75.19,75.71) 15-24 70.98 (70.43,71.53) 69.35 (68.82,69.88) 25-34 76.13 (75.63,76.63) 72.69 (72.25,73.13) 35-44 79.04 (78.42,79.66) 75.47 (74.91,76.03) 45-54 81.24 (80.51,81.96) 78.41 (77.79,79.03) 55-64 82,50 (81.67,83.33) 79.87 (79.15,80.60) 65-74 81.56 (80.72,82.40) 79.13 (78.35,79.91) 75+ 80.38 (79.61,81.15) 79.26 (78.41,80.11) CI: confidence interval		45-54	134.69	(133.51,135.87)	132.39	(131.28,133.49)
75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	75+       143.69       (141.96,145.42)       143.44       (141.60,145.28)         DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)		55-64	137.56	(136.22,138.91)	139.53	(138.17,140.90)
DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	DBP       Total       78.14       (77.84,78.43)       75.45       (75.19,75.71)         15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	DBP Total 78.14 (77.84,78.43) 75.45 (75.19,75.71) 15-24 70.98 (70.43,71.53) 69.35 (68.82,69.88) 25-34 76.13 (75.63,76.63) 72.69 (72.25,73.13) 35-44 79.04 (78.42,79.66) 75.47 (74.91,76.03) 45-54 81.24 (80.51,81.96) 78.41 (77.79,79.03) 55-64 82.50 (81.67,83.33) 79.87 (79.15,80.60) 65-74 81.56 (80.72,82.40) 79.13 (78.35,79.91) 75+ 80.38 (79.61,81.15) 79.26 (78.41,80.11) CI: confidence interval		65-74	143.98	(142.25,145.71)	145.16	(143.55,146.76)
15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	15-24       70.98       (70.43,71.53)       69.35       (68.82,69.88)         25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)		75+	143.69	(141.96,145.42)	143.44	(141.60,145.28)
25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	25-34       76.13       (75.63,76.63)       72.69       (72.25,73.13)         35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	DBP	Total	78.14	(77.84,78.43)	75.45	(75.19,75.71)
35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	35-44       79.04       (78.42,79.66)       75.47       (74.91,76.03)         45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)		15-24	70.98	(70.43,71.53)	69.35	(68.82,69.88)
45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	45-54       81.24       (80.51,81.96)       78.41       (77.79,79.03)         55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	45-54 81.24 (80.51,81.96) 78.41 (77.79,79.03) 55-64 82.50 (81.67,83.33) 79.87 (79.15,80.60) 65-74 81.56 (80.72,82.40) 79.13 (78.35,79.91) 75+ 80.38 (79.61,81.15) 79.26 (78.41,80.11) CI: confidence interval		25-34	76.13	(75.63,76.63)	72.69	(72.25,73.13)
55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)	55-64       82.50       (81.67,83.33)       79.87       (79.15,80.60)         65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)		35-44	79.04	(78.42,79.66)	75.47	(74.91,76.03)
65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)         CI: confidence interval	65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)         CI: confidence interval	65-74       81.56       (80.72,82.40)       79.13       (78.35,79.91)         75+       80.38       (79.61,81.15)       79.26       (78.41,80.11)         CI: confidence interval	65-74 81.56 (80.72,82.40) 79.13 (78.35,79.91) 75+ 80.38 (79.61,81.15) 79.26 (78.41,80.11) CI: confidence interval		45-54	81.24	(80.51,81.96)	78.41	(77.79,79.03)
75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval <t< td=""><td>75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval   <t< td=""><td>75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval   <t< td=""><td>75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval   <t< td=""><td></td><td>55-64</td><td>82.50</td><td>(81.67,83.33)</td><td>79.87</td><td>(79.15,80.60)</td></t<></td></t<></td></t<></td></t<>	75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval <t< td=""><td>75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval   <t< td=""><td>75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval   <t< td=""><td></td><td>55-64</td><td>82.50</td><td>(81.67,83.33)</td><td>79.87</td><td>(79.15,80.60)</td></t<></td></t<></td></t<>	75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval <t< td=""><td>75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval   <t< td=""><td></td><td>55-64</td><td>82.50</td><td>(81.67,83.33)</td><td>79.87</td><td>(79.15,80.60)</td></t<></td></t<>	75+         80.38         (79.61,81.15)         79.26         (78.41,80.11)           CI: confidence interval <t< td=""><td></td><td>55-64</td><td>82.50</td><td>(81.67,83.33)</td><td>79.87</td><td>(79.15,80.60)</td></t<>		55-64	82.50	(81.67,83.33)	79.87	(79.15,80.60)
CI: confidence interval	CI: confidence interval	CI: confidence interval	CI: confidence interval		65-74	81.56	(80.72,82.40)	79.13	(78.35,79.91)
					75+	80.38	(79.61,81.15)	79.26	(78.41,80.11)

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STROBE Statement—checklist of items that should be included in reports of observational studies

Background/rationale       2         Objectives       3         Methods       3         Study design       4         Setting       5         Participants       6         Variables       7         Data sources/       8*         measurement       9         Study size       10         Quantitative variables       11	<ul> <li>(a) Indicate the study's design with a commonly used term in the title or the (b) Provide in the abstract an informative and balanced summary of what wa and what was found</li> <li>Explain the scientific background and rationale for the investigation being</li> <li>State specific objectives, including any prespecified hypotheses</li> <li>Present key elements of study design early in the paper</li> <li>Describe the setting, locations, and relevant dates, including periods of recrue exposure, follow-up, and data collection</li> <li>(a) Cohort study—Give the eligibility criteria, and the sources and methods a selection of participants. Describe methods of follow-up</li> <li>Case-control study—Give the eligibility criteria, and the sources and methods are ascertainment and control selection. Give the rationale for the choice of and controls</li> <li>Cross-sectional study—Give the eligibility criteria, and the sources and methods as election of participants</li> <li>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed</li> <li>Case-control study—For matched studies, give matching criteria and the number of exposed and unexposed</li> </ul>	P1- s done P2 reporte P4-5 itment, P4-5 of ls of cases nods of P4
Background/rationale       2         Objectives       3         Methods       4         Study design       4         Setting       5         Participants       6         Variables       7         Data sources/       8*         measurement       9         Study size       10         Quantitative variables       11	and what was found         Explain the scientific background and rationale for the investigation being         State specific objectives, including any prespecified hypotheses         Present key elements of study design early in the paper         Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and methods of and controls         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	P2 reporte P P4-5 itment, P4-5 of ls of cases nods of P4
Background/rationale       2         Objectives       3         Methods       4         Study design       4         Setting       5         Participants       6         Variables       7         Data sources/       8*         measurement       8         Bias       9         Study size       10         Quantitative variables       11	Explain the scientific background and rationale for the investigation being State specific objectives, including any prespecified hypotheses Present key elements of study design early in the paper Describe the setting, locations, and relevant dates, including periods of recru exposure, follow-up, and data collection (a) Cohort study—Give the eligibility criteria, and the sources and methods selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods case ascertainment and control selection. Give the rationale for the choice of and controls Cross-sectional study—Give the eligibility criteria, and the sources and method selection of participants (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	reporte P P4-5 itment, P4-5 of ls of cases nods of P4
Objectives       3         Methods       4         Study design       4         Setting       5         Participants       6         Variables       7         Data sources/       8*         measurement       9         Study size       10         Quantitative variables       11	State specific objectives, including any prespecified hypotheses         Present key elements of study design early in the paper         Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods or case ascertainment and control selection. Give the rationale for the choice of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and methods         selection of participants         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	P P4-5 itment, P4-5 of ls of cases nods of P4
Objectives       3         Methods       4         Study design       4         Setting       5         Participants       6         Variables       7         Data sources/       8*         measurement       9         Study size       10         Quantitative variables       11	State specific objectives, including any prespecified hypotheses         Present key elements of study design early in the paper         Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods or case ascertainment and control selection. Give the rationale for the choice of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and methods         selection of participants         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	P P4-5 itment, P4-5 of ls of cases nods of P4
Methods         Study design       4         Setting       5         Participants       6         Variables       7         Data sources/       8*         measurement       8         Bias       9         Study size       10         Quantitative variables       11	Present key elements of study design early in the paper         Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and method selection of participants         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	P4-5 itment, P4-5 of Is of cases nods of P4
MethodsStudy design4Setting5Participants6Variables7Data sources/ measurement8*Bias9Study size10Quantitative variables11	Present key elements of study design early in the paper         Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and method selection of participants         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	itment, P4-5 of Is of cases nods of P4
Study design4Setting5Participants6Variables7Data sources/ measurement8*Bias9Study size10Quantitative variables11	Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods of and control selection. Give the rationale for the choice of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and method selection of participants         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	itment, P4-5 of Is of cases nods of P4
Setting5Participants6Variables7Data sources/ measurement8*Bias9Study size10Quantitative variables11	Describe the setting, locations, and relevant dates, including periods of recru         exposure, follow-up, and data collection         (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up         Case-control study—Give the eligibility criteria, and the sources and methods of and control selection. Give the rationale for the choice of and controls         Cross-sectional study—Give the eligibility criteria, and the sources and method selection of participants         (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	itment, P4-5 of Is of cases nods of P4
Participants    6      Variables    7      Data sources/    8*      measurement    8*      Bias    9      Study size    10      Quantitative variables    11	<ul> <li>exposure, follow-up, and data collection</li> <li>(a) Cohort study—Give the eligibility criteria, and the sources and methods a selection of participants. Describe methods of follow-up</li> <li><i>Case-control study</i>—Give the eligibility criteria, and the sources and methods case ascertainment and control selection. Give the rationale for the choice of and controls</li> <li><i>Cross-sectional study</i>—Give the eligibility criteria, and the sources and methods selection of participants</li> <li>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed</li> </ul>	P4-5 of Is of cases nods of P4
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Study size10Quantitative variables11	more than one group	Р
Study size10Quantitative variables11	Describe any efforts to address potential sources of bias	Р
Quantitative variables 11	Explain how the study size was arrived at	F
-	Explain how quantitative variables were handled in the analyses. If applicable	
Statistical methods 12	describe which groupings were chosen and why	P5-
	( <i>a</i> ) Describe all statistical methods, including those used to control for con	
-	(b) Describe any methods used to examine subgroups and interactions	P
-	(c) Explain how missing data were addressed	F
-	(d) Cohort study—If applicable, explain how loss to follow-up was addresse	
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-	<i>Cross-sectional study</i> —If applicable, describe analytical methods taking acc sampling strategy	1 1/1

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Participants	13*	(a) Report numbers of individuals at each stage of study-eg numbers potentially elig	gible,
		examined for eligibility, confirmed eligible, included in the study, completing follow	-up, and
		analysed	P7
		(b) Give reasons for non-participation at each stage	Р7
		(c) Consider use of a flow diagram	N/A
Descriptive	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and in	formation
data		on exposures and potential confounders	P7
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Cohort study-Report numbers of outcome events or summary measures over time	
		Case-control study-Report numbers in each exposure category, or summary measur	es of
		exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Р7
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and t	heir
		precision (eg, 95% confidence interval). Make clear which confounders were adjuste	d for and
		why they were included	P8
		(b) Report category boundaries when continuous variables were categorized	P6
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		(c) If relevant, consider translating estimates of relative risk into absolute risk for a m	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period	
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\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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# **BMJ Open**

## **Prevalence and distribution of hypertension and related risk factors in Jilin Province, China 2015: a cross-sectional study**

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Keywords:	prevalence, Hypertension < CARDIOLOGY, EPIDEMIOLOGY, China

SCHOLARONE<sup>™</sup> Manuscripts



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9 10	4	Junduo Wu <sup>1</sup> , Tianyi Li <sup>1</sup> , Xianjing Song <sup>1</sup> , Wei Sun <sup>1</sup> , Yangyu Zhang <sup>2</sup> , Yingyu Liu <sup>2</sup> ,
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12	5	Longbo Li <sup>1</sup> , Yunpeng Yu <sup>1</sup> , Yihang Liu <sup>1</sup> , Chao Qi <sup>1</sup> , Bin Liu <sup>1*</sup>
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# Abstract **Objective:** To investigate the prevalence and distribution of hypertension and its associated factors in Jilin province, China. Design: a cross-sectional study in four cities and four rural counties in the province as part of a national Chinese study. Participants and setting: A total of 15206 participants aged 15 years old or older selected using a stratified multistage random sampling method. Main outcome measures: prevalence of hypertension. **Results:** The prevalence of hypertension in Jilin province was found to be 24.7%. Moreover, the prevalence of hypertension increased with age in both sexes, and was higher in males than in females. The modifiable factors found to be associated with hypertension were, body mass index, smoking and alcohol drinking. The risk factors identified are similar to those in southern China, except smoking, which has no association with hypertension prevalence in the South. **Conclusions:** Age, sex, body mass index, smoking, and alcohol drinking are risk factors of hypertension. Control of these related risk factors, especially smoking, may be helpful in the treatment and management of hypertension in Jilin province. Strength and limitations of this study This cross-sectional population-based study evaluated a large representative sample of individuals from four cities and four rural counties in Jilin province. A large sample of participants allowed for the subgroups of related factors for

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statistical analysis.
The causality cannot be assumed between the risk factors and hypertension.
Data relevant to physical activity, salt intake and blood lipids were not collected.
Key words
Prevalence, hypertension, epidemiology, China
Introduction
As highlighted in the recent World Health Organization report, cardiovascular
diseases (CVD) are at the top of the list of the four prioritized non-communicable
diseases worldwide that require immediate global action plans for prevention and
control[1]. Hypertension is among the leading cause of cardiovascular diseases and
deaths worldwide [2, 3]. It is estimated that the global economic burden related to
hypertension could be as high as US\$ 370 billion [4].
In the People's Republic of China, the prevalence of hypertension has been
increasing dramatically from 5.1% in 1959, to 7.7% in 1979, 13.6% in 1991, and 18.8%
in 2002 [5, 6]. Furthermore, there is a disproportionately higher hypertension rate
reported among people living in the northern region of China[7, 8]. There are about
109.4 million people in the northeastern China. The province of Jilin is located in the
northeast of China, with a population of approximately 27.5 million according to the
National Bureau of Statistics. As for other northern provinces, Jilin has a longer
winter season in comparison with the southern China, and, limited by this
3

environment, the lifestyle of the people is different from the other parts of the country. An in-depth analysis of the survey results from Jilin province related to risk factors for hypertension will provide an opportunity to understand the differential reasons for hypertension in the North, and will assist in the development of effective intervention and control strategies for this preventable disease. The objectives of this study were: to estimate the prevalence of hypertension in Jilin province and to explore potential risk factors associated with hypertension in the province. This will provide information for making recommendations on the prevention and control of hypertension in the northern region of China. 

 72 Methods

#### 73 Study population

This cross-sectional study was conducted between July 2014 and December 2015 as a part of national China study. A 4-stage, stratified sampling method was used to select a study sample of the general population age 15 years and older in Jilin province, China. First, four cities from the urban areas and four counties from rural areas were selected using probability proportional to size (PPS). Then two districts or two townships were selected in each city or county using simple random sampling (SRS). Next, in each district and township, three communities or villages were chosen respectively using SRS. Finally, participants stratified by sex (50% men and 50% women) and age (aged 15-24, 25-34, 35-44, 45-54, 55-64, 65-74,  $\geq$ 75 years) were chosen using SRS according to the national population composition. Participants 

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were chosen from the list provided by the local government registers of households

[9]. Considering a design effect of 2.5 and assuming a prevalence of hypertension of 17.7% among the population aged 15 years and older, an estimated sample size of 15,200 participants was needed to ensure that the bound on the error of estimation (i.e. width of the 95% confidence interval (CI)) for the prevalence in the entire population and subpopulation defined by age and sex were less than 0.4% and 1.8%, respectively [9]. As a result, a total of 15,206 participants living in Jilin province over 6 months and aged 15 years and older were randomly selected to participate in the survey. Measurement A questionnaire interview and physical examination were conducted in the survey. The standardized questionnaire was developed by the national coordinating center of 

97 the Fuwai Hospital (Beijing, China) and included questions on demographic, health
98 behaviors and physical activities. The questionnaire was completed by the participants
99 in a face-to-face interview with trained staff.

The physical examination included blood pressure (BP), body weight and height. BP was measured on the right arm supported at the heart level after participants rested for five minutes, using the Omron HBP-1300 Professional Portable Blood Pressure Monitor (OMRON, Japan). BP was measured three times, with 30 seconds between each measurement. The average of three readings was used for further analysis [10]. Body weight without heavy clothing, basal metabolism (BM), body fat percentage

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106 (BFP) and visceral fat index (VFI) were measured using an OMRON body fat and weight measurement device (Vbody HBF-371, OMRON, Japan). Height was 107 108 measured without shoes using a standard right-angle device and a fixed measurement tape (to the nearest 0.5 cm). 109

110

#### Definitions 111

112 Hypertension was defined as systolic BP (SBP)≥140mmHg or diastolic BP  $(DBP) \ge 90$  mmHg, or self-reported use of antihypertensive medication [11]. Body 113 mass index (BMI) was calculated as weight in kilograms divided by height in meters 114 squared. Overweight was defined as BMI 25-30kg/m<sup>2</sup>, and obesity was defined as 115 BMI>30kg/m<sup>2</sup>. ê.je 116

117

#### 118 **Statistical analysis**

Data was entered and validated using Epidata<sup>®</sup> 3.0 software[12]. All estimates 119 and analyses were weighted to represent the population in Jilin Province aged 15 120 121 years or older. The weights were calculated based on the 2010 Jilin province population census data, and the sampling age, sex and geographic subgroups were 122 123 taken into account. Continuous data were presented as mean  $\pm$  standard deviation (SD) 124 or mean with 95% confidence intervals (CI), and differences between groups were compared using the t-est. Categorical data were presented as frequency, rate and 95% 125 126 CI, and the prevalence between different groups was compared using the corrected Rao-Scott chi-square test. Logistic regression analysis was conducted assessing the 127

relationship of hypertension with age, sex, obesity, smoking, and alcohol drinking for
hypertension adjusted for demographic factors, that have been included in similar
studies, including sex, region, age, education level, employment status, marital status,
BMI, and family history of hypertension. All analyses were conducted using SPSS<sup>®</sup>
18.0 software[13].

- 133
- 134 **Results**
- 135 Distribution of participants

A total of 14,956 participants from 15,206 eligible participants (6,946 males and 8,010 females; aged 15–97 years) completed the survey and were included in the statistical analysis. The percentage of males and females were 50.63% and 49.37%, respectively. The non-responders (1.6%) were mainly young people with nonresponse likely related to their busy work schedule.

- 141
- 142 Characteristics of participants

The average age of the participants was 45.5 years, with the average age for males being 45.6±19.6 years and for females 45.5±18.9 years. There was no statistically significant difference in age between the sexes (p=0.92). The distribution of participants by age and sex are shown in Table 1. The BMI of the participants was 24.01±3.67 kg/m<sup>2</sup>, BM was (1397.47±244.15), BFP was 26.20±8.4 and VFI was 8.54±4.99. The mean SBP of the participants was 128.92±17.97) mmHg, and the mean DBP was 76.81±10.36 mmHg. These physical characteristics by age and sex are

150	shown in Supplementary Table 1. All these characters were statistically significantly
151	different between males and females (p<0.01). In particular, BM and VFI for males
152	was higher than for females in all age groups (Figure 1A and 1B), while BFP for
153	females was higher than males in all age groups (Figure 1C). BMI reached its highest
154	value for males in the 35-44 year age group and for females in the 55-66 year age
155	group (Figure 1D). The SBP was similar between males and females in all age groups
156	(Figure 1E), yet the DBP of males was higher than for female in all age groups
157	(Figure 1F).
158	(Figure IF).
159	Lifestyle risk factors - obesity, smoking and alcohol drinking
160	The prevalence of overweight and obesity of participants was 29.8% and 6.2%,
161	respectively. The prevalence of overweight for the male participants was 30.9%,
162	higher than for the female participants at 28.7% (p=0.013). On the other hand, there
163	was no statistical difference between the prevalence of obesity of male participants
164	(6.3%) and female participants (6.2%) (p=0.78). The percentage of current smoking
165	and ever smoking was 22.7% and 1.4%, respectively. When stratified by sex, the
166	percentage of current smoking in males (36.9%) was higher than in females (8.2%)
167	(p< $0.001$ ). Similarly, the percentage of ever smoking in males (2.3%) was higher than
168	that in females (0.5%) (p<0.001). The percentage of alcohol drinking was 17.6%. The
169	percentage in males (32.0%) was significantly higher than in females (2.9%)
170	(p<0.001). The risk factors BMI, smoking and alcohol drinking, summarized by age
171	and sex, are shown in Table 2.

172	

# Prevalence of hypertension stratified by non-modifiable factors-age and sex Of the 14,956 participants, 4,332 were diagnosed with hypertension, and the prevalence of hypertension was 24.7% (95% CI: 23.9%, 25.5%). The prevalence of hypertension was larger for the older age groups, and was higher in males (25.6%) than in females (23.8%) (p=0.03). For each age group less than 45 years, the prevalence of hypertension in males was higher than in females (p<0.001); while for the 65-74 year age group, the prevalence of hypertension in females was higher than in males (p=0.04); and in the other age groups, the prevalence of hypertension in males and females showed no statistical difference (p>0.05). The prevalence of hypertension stratified by age and sex is shown in Table 3.

# 184 Prevalence of hypertension stratified by modifiable factors-obesity, smoking and

### 185 alcohol drinking

The prevalence of hypertension was statistically different across BMI categories (p<0.001); the highest prevalence being reported was 48.1% in the obese group, followed by the overweight group at 35.7%. When stratified by smoking, the prevalence of hypertension also showed statistical differences between the current smoking, ever smoking, and never smoking groups (p<0.001); with the highest prevalence of 53.1% in the ever smoking group, followed by 32.2% in the current smoking group and 22.0% in the never smoking group. The prevalence of hypertension in the alcohol drinking group was 34.6%, higher than 22.6% in the 

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no-alcohol drinking group (p<0.001). The prevalence of hypertension stratified by</li>BMI, smoking and alcohol drinking are shown in Table 4.

### 197 Factors associated with hypertension

Several factors, including age, sex, obesity, smoking, and alcohol drinking, are associated with the prevalence of hypertension, both in the crude model and adjusted logistic model. In particular, in the absence of adjusting for other factors, the univariate logistic model indicated that the risk of hypertension was greater in males with an OR=1.1 (95% CI: 1.01, 1.2) than in females, overweight partipants with an OR=2.52 (95% CI: 2.3, 2.77) than in normal participants, obese participants with an OR=4.21 (95% CI: 3.56, 4.96) than in normal participants, smokers with OR=1.64 (95% CI: 1.48, 1.81) than in non-smokers, and alcohol drinkers with OR=1.81 (95% CI: 1.62, 2.02) than in non-alcohol drinkers. All the difference were statistically significant (p < 0.05). A multivariable logistic regression model was used to adjust for potential influencing factors. After adjustment for age, sex, region, education level, employment status, BMI, family history of hypertension, and marital status that may affect hypertension, the risk of hypertension was greater in males with an adjusted OR=1.26 (95% CI:1.13, 1.39) than in females, in overweigh participants with an adjusted OR=2.3 (95% CI: 2.06, 2.58) than in normal participants, in obese participants with an adjusted OR=5.11 (95% CI: 4.16, 6.27) than in normal participants, in smokers with an adjusted OR=1.28 (95% CI: 1.13, 1.46) than in non-smokers, and in alcohol drinkers with an adjusted OR=1.49 (95% CI: 1.28, 1.73). 

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2 3 4	216	These results are shown in Table 5.
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8 9	218	Discussion
10 11	219	With the estimated prevalence of hypertension in Jilin province of 24.7%, a
12 13 14	220	population of approximately 6.8 million in the province are hypertensive. At the
15 16	221	national level, the prevalence of hypertension in Jilin is comparable to that in
17 18 19	222	Zhejiang province [12]; while the prevalence is lower than in other regions in China,
20 21	223	including Jiangxi [13], Inner Mongolia [14], and Macau [15], as well as, lower than
22 23 24	224	the overall prevalence in China [16]. Worldwide, this prevalence is lower than that in
25 26	225	the US, the UK, but is higher than that in Canada [4]. However, there are some
27 28 29	226	limitations in terms of the direct comparisons among these studies, given the varying
30 31	227	methods and environments and variations of population genetics, and the different
32 33	228	population age structures.
34 35 36	229	Although the prevalence of 24.7% is lower than 30.8% that was found in 2012
37 38	230	[17], it is still not acceptable in terms of optimal hypertension health in the province.
39 40 41	231	Our study found that the prevalence of overweight and obesity was 29.8% and 6.2%,
42 43	232	respectively, which is higher than that reported at the national level of 17.7% and
44 45 46	233	5.6%, respectively[18]. Several studies have shown that obesity is a risk factor for the
47 48	234	development of hypertension[19-21]. Obesity can increase hypertension through
49 50 51	235	multiple mechanisms, including insulin resistance, activation of sympathetic nervous
52 53	236	system, sodium retention leading to increase in renal reabsorption, and activation of
54 55	237	the renin-angiotensin system[22]. The growing number of people with obesity and
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59		For peer review only - http://bmiopen.hmi.com/site/about/quidelines.xhtml

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238	being overweight in the province of Jilin presents a strong indicator of the potential
239	risk of future increasing incidence of hypertension. Unfortunately, this modifiable risk
240	factor has exhibited no change in between the report in 2012 and now[17], not to
241	mention that the population of overweight and obesity may have been underestimated,
242	since the standard definition of overweight and obesity used in our research may be
243	set too high for asian people[23, 24]. Moreover, some people may be abdominal obese
244	with a normal BMI value (18.5-24.9kg/m <sup>2</sup> ). Studies have reported that despite the
245	normal BMI value, abdominal obesity is also a risk factor for hypertension
246	worldwide[25, 26]. This modifiable risk factor deserves attention and requires an
247	effective proactive intervention program to slow and ultimately reduce the number of
248	individuals with obesity becoming hypertensive.
249	Our study found that the overall prevalence of hypertension increases with age in
250	both males and females, especially in the range of 35-74 years of age. This result
251	supports the hypothesis that age is one of the risk factors of hypertension [27-30]. An
252	increasing lifespan among the population in Jilin requires that a practical and effective

both males and females, especially in the range of 35-74 years of age. This result supports the hypothesis that age is one of the risk factors of hypertension [27-30]. An increasing lifespan among the population in Jilin requires that a practical and effective hypertension management strategy of intervention and control targeting the aging population be devloped. The overall prevalence of hypertension is higher in males than in females. However, the prevalence in females increased more rapidly than in males aged 65-74 years. This may be partially explained by hormonal changes in post-menopausal women and the difference in lifespan between males and females [4, 31]. However, the exact mechanisms need to be explored.

Consistent with previous studies [32, 33], our study also showed that smoking,

260	both current and ever smoking, is associated with an increased risk of hypertension.
261	Smoking can increase blood viscosity, stimulate the adrenergic nervous system, and
262	contribute to the development of both micro- and macro-vascular diseases[34].
263	Although some studies reported weak associations between smoking and hypertension
264	[13, 20], smoking is considered a major risk factor worldwide [13, 20, 35-37],
265	Additionally, drinking of alcohol is also a factor associated with increasing the risk of
266	hypertension in our study, which is consistent with previous studies [4, 38-40]. These
267	results indicate that changes in living habits, including quitting smoking and alcohol
268	drinking, should help to reduce the prevalence of hypertension.
269	National studies reported that the prevalence of hypertension is higher in northern
270	China than that in southern China[7, 16]. When comparing the associations between
271	risk factors and hypertension with Zhejiang province located in the South[12], we
272	found that the risk of hypertension with demographic factors, such as age, sex, and
273	region, and clinical factors, such as family history of hypertension and abdominal
274	waist circumference, were similar in Jilin province and in southern China. When it
275	comes to the lifestyle factors, the risk of hypertension with obesity and alcohol
276	drinking were similar, however, there was a marked difference in the modifiable risk
277	factor smoking; in particular, in Jilin province there was a strong association with an
278	adjusted OR=1.28 (95% CI: 1.13, 1.46), whereas no association between smoking and
279	hypertension in southern China was found, with an adjusted OR=1.0 (95% CI: 0.9,
280	1.1). These findings indicate that programs aimed at reducing smoking would be an
281	important step to mitigate the prevalence of hypertension in Jilin province. Some

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282	social factors including retirement status, marital status, and educationan level were
283	also different between the North and the South. Of interest, there was a difference on
284	BFP categories. In particular, for category 10-19 for males and 20-29 for females,
285	there was no association between BFP and hypertension in Jilin province with an
286	adjusted OR=0.95 (95%CI: 0.71, 1.27), whereas in this category BFP is protective
287	againt hypertension in south China with an adjusted OR=0.6 (95% CI: 0.5, 0.8). In the
288	range of over 25 for males and over 35 for females, BFP is strongly associated with
289	hypertension in Jilin province with an adjusted OR=1.45 (95% CI: 1.07, 1.96),
290	whereas no association was found in the South with an adjusted OR=1.3 (95%CI: 1.0,
291	1.5). These results indicate that BFP tends to be more of a risk for hypertension in the
292	North compared to the South. Studies have reported that high BFP increase blood
293	pressure[41, 42]. There are also studies reporting that the relationship between BFP
294	and BMI may be different in different ethnic groups[43], and the latter is already
295	known to be a risk factor for hypertension. These studies provide inside of the
296	different role BFP has on hypertension in the northern and southern China. Further
297	studies on the relationship between BFP and hypertension need to be done.
298	A survey in 2012 found a prevalence of hypertension of 30.8% [17]. The

prevalence of hypertension in our study was lower. This reduction may be related to the following two factors. First, the government of Jilin province is aware of the damage and burdern of hypertension and is dedicated to increase the funding of medical insurance, especially for rural residents, from RMB ¥3.9 billion in 2012 to RMB ¥6.4 billion, according to the statistical bureau of Jilin province. Second, new

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304	hypertension guidelines on grass-roots management of hypertension[44] and patient
305	education[45] have been published in China since 2012. However, some key
306	modifiable risk factors have exhibited slight negative changes, in particular, the trend
307	towards obesity, drinking and smoking. This can be due in part to the evolving
308	economy of Jilin province with the gross domestic product increasing from RMB
309	¥361.5 billion in 2015, to RMB ¥857.8 billion in 2010, to RMB ¥1.4 trillion in 2015,
310	according to the statistical bureau of Jilin province. To reverse these trends will
311	require an effective and workable intervention program to control hypertension by
312	incorporating best practices identified in theory and practice. For example, rates of
313	hypertension awareness have greatly improved from 24.4% to 42.6%, treatment from
314	20.0% to 24.2% based on national surveys[16]. However, the control rate is only 9.3%
315	in comparison with 53% in the USA[4]. One of the challenges is to improve
316	adherence to anti-hypertension drugs.
317	There are some limitations in this study. First, this is a cross-sectional study
318	design, thus the causality cannot be assumed between the risk factors and
319	hypertension. Second, due to limited financial resource, data relevant to physical
320	activity, salt intake and blood lipids were not collected. Third, the decrease of
321	prevalence of hypertension in our study compared with that in 2012 may be related
322	with sampling factor.

In summary, the prevalence of hypertension in Jilin province decreased compared with that in 2012, and is lower than the overall prevalence in China. In addition, the study showed that hypertension is associated with age, sex, obesity, smoking and

alcohol drinking. In particular, smoking seemed to be responsible for the different prevalence of hypertension in northern and southern China. These factors above, especially smoking, might be important points to control and manage hypertension in Jilin province. Reference 1. Organization WH: Global action plan for the prevention and control of noncommunicable diseases 2013-2020, 2013. 2. Cifkova R, Fodor G, Wohlfahrt P: Changes in Hypertension Prevalence, Awareness, Treatment, and Control in High-, Middle-, and Low-Income Countries: An Update. Current hypertension reports 2016, 18(8):62. 3. Neuhauser HK, Adler C, Rosario AS, Diederichs C, Ellert U: Hypertension prevalence, awareness, treatment and control in Germany 1998 and 2008-11. Journal of human hypertension 2015, 29(4):247-253. 4. Joffres M, Falaschetti E, Gillespie C, Robitaille C, Loustalot F, Poulter N, McAlister FA, Johansen H, Baclic O, Campbell N: Hypertension prevalence, awareness, treatment and control in national surveys from England, the USA and Canada, and correlation with stroke and ischaemic heart disease mortality: a cross-sectional study. BMJ open 2013, 3(8):e003423. 5. Wu X, Duan X, Gu D, Hao J, Tao S, Fan D: Prevalence of hypertension and its trends in Chinese populations. International journal of cardiology 1995, 52(1):39-44. 6. Wu Y, Huxley R, Li L, Anna V, Xie G, Yao C, Woodward M, Li X, Chalmers J, Gao R et al: Prevalence, awareness, treatment, and control of hypertension in China: data from the China National Nutrition and Health Survey 2002. Circulation 2008, 118(25):2679-2686. 7. Reynolds K, Gu D, Muntner P, Wu X, Chen J, Huang G, Duan X, Whelton PK, He J, Inter ACG: Geographic variations in the prevalence, awareness, treatment and control of hypertension in China. J Hypertens 2003, 21(7):1273-1281. 8. Wang X, Bots ML, Yang F, Hoes AW, Vaarties I: Prevalence of hypertension in China: a systematic review and meta-regression analysis of trends and regional differences. J Hypertens 2014, **32**(10):1919-1927; discussion 1927. 9. Wang Z, Zhang L, Chen Z, Wang X, Shao L, Guo M, Zhu M, Gao R, China Hypertension Survey G: Survey on prevalence of hypertension in China: background, aim, method and design. International journal of cardiology 2014, 174(3):721-723. 10. Fodor JG, Leenen FH, Helis E, Turton P: 2006 Ontario Survey on the Prevalence and Control of Hypertension (ON-BP): Rationale and design of a community-based cross-sectional survey. Canadian Journal of Cardiology 2008, 24(6):503-505. 11. Lenfant C, Chobanian AV, Jones DW, Roccella EJ: Seventh report of the joint national committee on the prevention, detection, evaluation, and treatment of high blood pressure (JNC 7). Hypertension 2003, 41(6):1178-1179. 

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24	469	Footnotes Contributors
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20 27	471	Contributors
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29	472	BL is involved in the design, JW, XS, LL, YY, YL, and CQ collected the data, YZ
30 31	473	and YL performed the statistical analysis, TL, WS, and BL wrote the paper. All
32 33	474	authors reviewed and approved the final version of the paper.
34	475	
35 36	476	Ethics approval
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38 39	477	This study was approved by the Fuwai Hospital Ethics Review Board.
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49	483	
50 51	404	Composing interests
51 52	484	Competing interests
53	485	None declared.
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50 57	487	Data sharing statement
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# 489 Figure Captions

490	Figure 1: Trends of physical characteristics by age and sex. (A) basal metabolism BM
491	(B) body fat percentage - BFP (C) visceral fat index - VFI (D) body mass index - BMI
492	(E) systolic blood pressure - SBP (F) diastolic blood pressure - DBP

**Table 1:** Distribution of participants by age and sex in Jilin province (N, %)

Δαρ	Ma	ale	Fen	nale	То	Total	
Age	Ν	%	Ν	%	Ν	%	
15-24	1120	9.07	1146	8.51	2266	17.59	
25-34	1316	8.91	1520	8.52	2836	17.43	
35-44	1084	11.95	1359	11.40	2443	23.35	
45-54	1043	10.02	1333	9.68	2376	19.70	
55-64	950	6.36	1121	6.47	2071	12.83	
65-74	755	3.01	823	3.23	1578	6.24	
75+	678	1.31	708	1.55	1386	2.86	
Total	6946	50.63	8010	49.37	14956	100.0	

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		BN	/II			Alcohol Drinking		
	<18.5	18.5-25.0	25.0-30.0	>30.0	Current	Ever	Never	
Male								
15-24	13.33	67.57	14.85	4.25	6.95	0.36	92.69	5.80
	(11.11,15.91)	(64.24,70.73)	(12.58,17.46)	(3.03,5.93)	(5.47,8.80)	(0.10,1.22)	(90.79,94.22)	(4.62, 7.26)
25-34	2.80	57.76	31.36	8.08	39.19	0.64	60.17	29.70
	(1.98,3.93)	(54.70,60.77)	(28.57,34.30)	(6.52,9.96)	(36.20,42.26)	(0.30,1.37)	(57.09,63.17)	(26.96, 32.60)
35-44	1.89	54.86	35.26	7.99	46.92	1.32	51.76	39.90
	(0.18,3.01)	(51.49,58.18)	(32.10,38.55)	(6.35,10.02)	(43.57,50.30)	(0.79,2.18)	(48.39,55.12)	(36.62, 43.26)
45-54	1.56	55.63	36.25	6.56	48.42	3.19	48.38	44.70
	(0.93,2.60)	(52.33,58.88)	(33.14,39.47)	(5.11,8.39)	(45.13,51.73)	(2.25,4.52)	(45.10,51.68)	(41.44, 48.00)
55-64	0.79	59.10	35.17	4.94	44.79	5.19	50.02	39.30
	(0.39,1.60)	(55.67,62.44)	(31.96,38.52)	(3.65,6.66)	(41.38,48.25)	(3.88,6.91)	(46.57,53.47)	(35.99, 42.71)
65-74	2.16	60.45	33.51	3.88	32.13	6.99	60.88	34.30
	(1.26,3.69)	(56.54,64.22)	(29.91,37.33)	(2.66,5.62)	(28.57,35.91)	(5.22,9.30)	(56.97,64.65)	(30.65, 38.14)
75+	3.71	62.83	30.22	3.23	22.06	5.58	72.35	18.74
	(2.53,5.42)	(58.82,66.68)	(26.61,34.10)	(2.01,5.15)	(18.85,25.64)	(3.96,7.82)	(68.54,75.87)	(15.72, 22.19)
Female								
15-24	13.46	70.77	12.55	3.22	0.36	0.00	99.64	0.76
	(11.24,16.03)	(67.48,73.85)	(10.34,15.16)	(2.34,4.43)	(0.11,1.16)		(98.84,99.89)	(0.43,1.35)
25-34	6.46	66.10	22.33	5.11	2.90	0.06	97.04	3.50
	(5.25,7.94)	(63.37,68.72)	(20.06,24.79)	(3.97,6.55)	(2.05,4.08)	(0.01,0.44)	(95.85,97.89)	(2.65,4.62)
35-44	1.81	61.59	29.86	6.74	8.00	0.07	91.93	4.40
	(1.16,2.81)	(58.64,64.45)	(27.18,32.67)	(5.38,8.41)	(6.45,9.88)	(0.01,0.50)	(90.05,93.49)	(3.37,5.73)

Table 2: Distribution of participants by age and sex stratified by body mass index, smoking and alcoholic drinking in Jilin province (%, 95%CI) 496

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7	45-54	1.99	54.20	36.38	7.44	10.36	0.52
8		(1.29,3.04)	(51.27,57.09)	(33.62,39.24)	(6.05,9.11)	(8.69,12.31)	(0.23,1.17)
9	55-64	2.53	48.89	40.24	8.34	16.81	1.46
10		(1.72,3.71)	(45.72,52.08)	(37.17,43.39)	(6.72,10.30)	(14.58,19.30)	(0.85,2.49)
11	65-74	4.89	50.05	38.50	6.57	17.61	1.68
12 13		(3.53,6.72)	(46.31,53.78)	(34.91,42.22)	(4.94,8.67)	(14.97,20.60)	(0.93,2.99)
14	75+	10.17	57.46	26.17	6.20	12.82	1.27
15		(7.87,13.04)	(53.37,61.45)	(22.77,29.89)	(4.50,8.50)	(10.29,15.87)	(0.64,2.50)
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**BMJ** Open

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(87.14,90.83)

81.73

(79.16,84.05)

80.71 (77.62,83.47)

85.91

(82.77,88.55)

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(2.23, 4.25)

2.53

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	Age		Male		Female		Total
	group	n	CR(95%CI)	n	CR(95%CI)	n	CR(959
-	15-24	80	6.86(5.27,8.87)	23	1.88(1.19,2.96)	103	4.45(3.5
	25-34	106	8.47(6.89,10.36)	50	4.28(3.20,5.69)	156	6.42(5.4
	35-44	221	21.00(18.36,23.91)	195	15.21(13.14,17.55)	416	18.17(16.4
	45-54	379	35.13(32.06,38.33)	430	32.57(29.89,35.36)	809	33.87(31.8
	55-64	449	46.42(43.00,49.87)	576	50.72(47.54,53.90)	1025	48.59(46.2
	65-74	451	59.91(55.98,63.71)	518	65.32(61.72,68.76)	969	62.71(60.0
	75+	405	61.24(57.24,65.10)	449	62.37(58.30,66.28)	854	61.86(59.0
	Total	2091	25.60(24.41,26.79)	2241	23.84(22.80,24.89)	4332	24.73(23.9
498	CI: confi	idence in	nterval				
499							
			nterval				

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		Bl	II			Smoking	Alcohol Drinking		
	<18.5	18.5-25.0	25.0-30.0	>30.0	Current	Ever	Never	Yes	No
Male									
15-24	1.48	4.39	16.22	30.17	8.17	13.13	6.73	11.60	6.56
	(0.37,5.76)	(2.94,6.51)	(10.62,24.00)	(16.58,48.44)	(3.45,18.15)	(1.35,62.57)	(5.10,8.84)	(5.85,21.69)	(4.95, 8.66)
25-34	1.45	5.33	9.15	30.70	11.49	6.89	6.51	10.64	7.55
	(0.20,9.72)	(3.78,7.46)	(6.43,12.85)	(21.42,41.86)	(8.66,15.08)	(0.88,38.13)	(4.80,8.78)	(7.63, 14.64)	(5.80, 9.77)
35-44	5.49	14.76	25.87	45.98	23.76	36.23	18.11	28.02	16.34
	(0.97,25.57)	(11.77,18.34)	(21.16,31.22)	(34.53,57.87)	(19.72,28.33)	(16.51,62.01)	(14.77,22.00)	(23.40, 33.16)	(13.35,19.84)
45-54	27.39	25.02	44.90	68.73	37.10	41.53	32.74	43.01	28.76
	(10.96,53.63)	(21.38,29.05)	(39.57,50.35)	(55.83,79.27)	(32.60,41.83)	(25.83,59.16)	(28.51,37.27)	(38.20, 47.96)	(24.95, 32.91)
55-64	11.46	39.64	55.87	65.91	47.15	61.46	44.21	52.10	42.74
	(2.44,40.14)	(35.33,44.11)	(50.07,79.30)	(50.62,78.48)	(42.04,52.33)	(46.39,74.61)	(39.43,49.09)	(46.61, 57.54)	(38.42, 47.18)
65-74	19.58	52.27	73.86	80.86	60.60	74.69	57.84	66.86	56.58
	(6.35,46.63)	(47.16,57.34)	(67.56,15.96)	(61.30,91.85)	(53.60,67.20)	(59.79,85.42)	(52.78,62.74)	(60.21, 72.89)	(51.40, 61.04)
75+	37.87	58.85	66.71	83.47	68.66	59.10	59.15	65.17	60.34
	(21.57,57.45)	(53.77,63.76)	(59.34,73.34)	(57.75,94.91)	(60.13,76.08)	(41.42,74.69)	(54.42,63.71)	(55.63, 73.63)	(55.90, 64.62)
Female									
15-24	1.50	0.91	5.62	10.02	0.00	0.00	1.88	0.00	1.89
	(0.37,5.81)	(0.42,1.98)	(2.53,12.01)	(3.85,23.67)			(1.19,2.97)		(1.19,2.98)
25-34	0.00	2.16	6.56	27.09	12.35	0.00	4.04	0.66	4.41
		(1.29,3.59)	(4.03,10.51)	(16.97,40.31)	(4.36,30.33)		(2.98,5.44)	(0.09,4.63)	(3.29,5.87)
35-44	17.78	9.70	22.05	34.59	19.76	100.00	14.75	25.47	14.74
	(5.86,42.90)	(7.67,12.20)	(17.69,27.14)	(24.35,46.49)	(12.41,29.97)	(100.00,100.00)	(12.62,17.17)	(14.99,39.84)	(12.65,17.11

Table 4 Prevalence of hypertension by age and say stratified by body mass index, smoking and alcoholic drinking (%, 95% CD) 500

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34.92

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			(35.84,45.30)	(49.33,69.86)	(26.73,44.12)	(22.45,90.03)	(29.31,35.08)	(15.31,44.19)	(30.01,35
55-64	40.61	39.07	61.42	70.47	51.28	62.47	50.40	51.62	50.70
	(23.68,60.12)	(34.71,43.61)	(56.48,66.14)	(59.27,79.64)	(43.64,58.86)	(35.28,83.56)	(46.87,53.92)	(31.60,71.13)	(47.48,53
65-74	38.58	59.74	74.83	72.04	65.26	57.48	65.50	50.45	65.60
	(24.16,55.33)	(54.53,64.73)	(69.27,79.68)	(57.14,83.28)	(56.45,73.13)	(29.24,81.56)	(61.48,69.31)	(24.78,75.88)	(61.97,69
75+	45.30	60.64	73.24	60.53	64.01	100.00	61.57	51.72	62.64
	(32.73,58.49)	(55.25,65.79)	(65.79,79.57)	(43.53,75.31)	(52.10,74.41)	(100.00,100.00)	(57.18,65.79)	(26.49,76.10)	(58.53,66

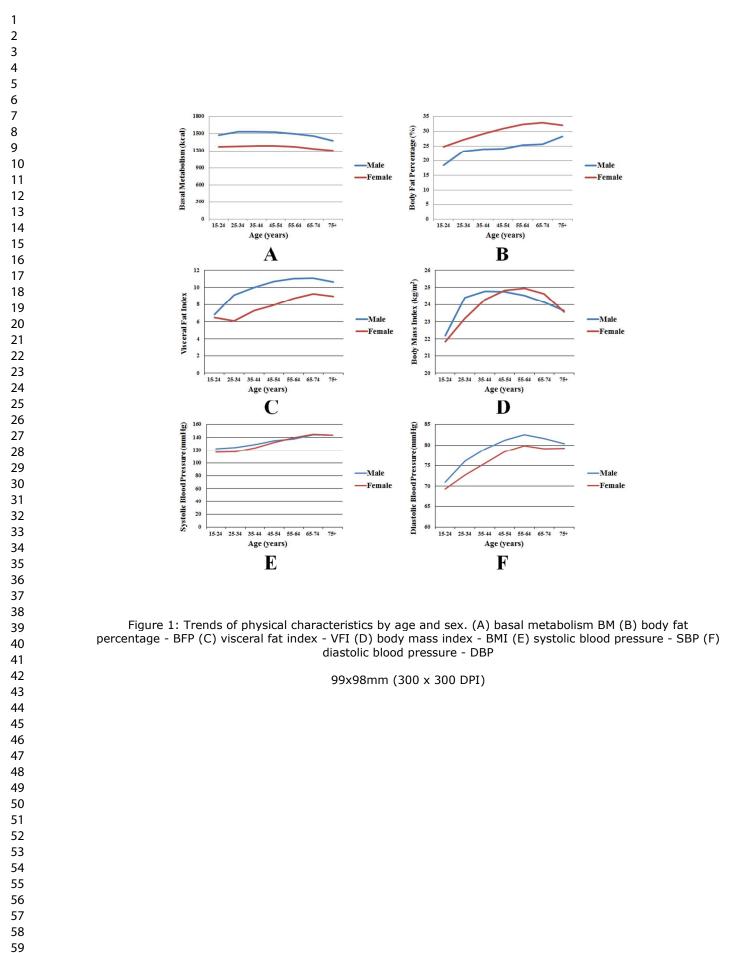
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		Hypertensio	n prevalence
		Unadjusted	Adjusted
	Age(Ref: 15-24)		
	25-34	1.47(1.09,1.99)	1.05(0.71,1.55)
	35-44	4.77(3.65,6.24)	2.83(1.90,4.22)
	45-54	11.01(8.51,14.24)	6.93(4.69,10.24)
	55-64	20.31(15.69,26.29)	13.43(9.06,19.90)
	65-74	36.14(27.73,47.11)	26.18(17.56,39.03)
	75+	34.85(26.65,45.57)	29.89(19.83,45.03)
	Sex(Ref: female)	1.1(1.01,1.2)	1.25(1.13,1.39)
	Region(Ref: Urban)	1.19(1.09,1.3)	1.25(1.12,1.39)
	Race(Ref: Han)	1.15(0.93,1.42)	0.93(0.74,1.18)
	Employment(Ref: be employed)	1.15(0.95,1.42)	0.99(0.74,1.10)
	Retired	2.67(2.22,3.2)	0.67(0.53,0.85)
	Student	0.15(0.11,0.21)	1.09(0.71,1.70)
	Unemployed	1.18(1.07,1.3)	0.84(0.74,0.95)
	Marital(Ref: married)	0.72(0.63,0.83)	1.29(1.00,1.65)
	Education level(Ref: college or higher)		
	Illiterate	6.69(5.19,8.63)	2.18(1.62,2.93)
	Primary	3.26(2.7,3.93)	1.98(1.60,2.44)
	Middle	1.55(1.24,1.94)	1.24(0.97,1.57)
	BMI(Ref: Normal)		
	Overweight	2.22(2.01,2.46)	2.30(2.06,2.57)
	Obese	3.96(3.31,4.75)	5.17(4.20,6.37)
	AWC(Ref:<90M,<85F)		
	≥90M, ≥85F	1.41(1.23,1.62)	1.35(1.16,1.57)
	≥95M, ≥90F	1.5(1.32,1.72)	1.68(1.43,1.96)
	Family history of hypertension	1.74(1.55,1.96)	2.35(2.06,2.67)
	Family history of stroke	1.33(0.85,2.06)	1.79(1.09,2.92)
	Family history of CAD	3.18(2.64,3.83)	1.65(1.33,2.03)
	Smoker(Ref: no)	1.37(1.23,1.53)	1.23(1.08,1.40)
	Drinker(Ref: no)	1.56(1.38,1.77)	1.47(1.27,1.71)
	VAI (Ref:<10)		
	10~14	1.6(1.41,1.8)	1.40(1.22,1.60)
	15~30	2.69(2.29,3.16)	2.05(1.69,2.49)
	BFP(Ref: $<10M$ , $<20F$ )	2.03 (2.23,0.10)	2.00(1.0),2.1))
	10~19M, 20~29F	1.31(1,1.71)	0.95(0.71,1.27)
	20~24M, 30~34F	2.72(2.09,3.55)	1.24(0.92,1.66)
	$\geq 25M$ , $\geq 35F$	3.48(2.67,4.54)	1.45(1.07,1.96)
502		· · · · · · · · · · · · · · · · · · ·	
502	CI: confidence interval; BMI: body mass inde		
503	coronary heart disease; M: male; F: female; VAI		
504	Adjusted for sex, region, age, education level, e	mpioyment status, ma	irnai status, BMI, an

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			y age and sex in Jili Male	1	Female
	Age	Maan	95%CI	Mean	
D) (	- The second sec	Mean			95%CI
BM	Total	1511.50	(1504.56,	1280.52	(1276.09, 1284.9
	15.04	1 450 00	1518.43)	1070.01	(12 ( 1 00 1 20 1 5
	15-24	1478.92	(1456.95,	1279.31	(1264.09, 1294.5)
		1 500 00	1500.88)	1001 44	
	25-34	1538.93	(1524.04,	1281.66	(1272.68,1290.64
			1553.81)		
	35-44	1534.48	(1519.02,	1293.35	(1284.03, 1302.6
			1549.95)		
	45-54	1528.84	(1514.65,	1293.81	(1284.74, 1302.8
			1543.02)		
	55-64	1499.65	(1486.40,	1274.36	(1264.67, 1284.0
			1512.90)		
	65-74	1460.36	(1443.82,	1241.86	(1230.00, 1253.7)
			1476.89)		
	75+	1382.81	(1367.17,	1209.84	(1195.08, 1224.5
			1398.45)		
Body Fat	Total	23.28	(23.03, 23.53)	29.19	(29.02, 29.35)
percentage					
	15-24	18.46	(17.52, 19.40)	24.78	(24.38, 25.18)
	25-34	23.26	(22.87, 23.65)	27.20	(26.88,27.52)
	35-44	24.02	(23.64, 24.40)	29.19	(28.86, 29.52)
	45-54	24.09	(23.76, 24.41)	30.95	(30.61, 31.29)
	55-64	25.34	(24.58, 26.10)	32.39	(31.99, 32.80)
	65-74	25.74	(25.30, 26.17)	32.97	(32.46, 33.48)
	75+	28.31	(27.06, 29.56)	32.08	(31.15, 33.00)
VAI	Total	9.63	(9.49, 9.77)	7.42	(7.29, 7.55)
	15-24	6.81	(6.54, 7.08)	6.48	(6.05, 6.91)
	25-34	9.13	(8.81, 9.46)	6.07	(5.83, 6.30)
	35-44	10.01	(9.70, 10.32)	7.25	(6.96, 7.54)
	45-54	10.71	(10.39, 11.03)	7.90	(7.68, 8.11)
	55-64	11.06	(10.74, 11.37)	8.71	(8.47, 8.96)
	65-74	11.11	(10.72, 11.49)	9.27	(8.81, 9.73)
	75+	10.64	(10.21, 11.07)	8.95	(8.56, 9.35)
BMI	Total	24.15	(24.05,24.25)	23.88	(23.78,23.97)
	15-24	22.20	(21.93,22.47)	21.86	(21.63,22.10)
	25-34	24.41	(24.18,24.63)	23.20	(22.99,23.42)
	35-44	24.78	(24.55,25.01)	23.20	(24.08,24.51)
	45-54	24.78 24.75	(24.53,25.01)	24.29 24.82	(24.63,25.02)
	43-34 55-64	24.73 24.54	(24.33,24.76)	24.82 24.96	(24.74,25.18)

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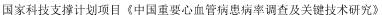
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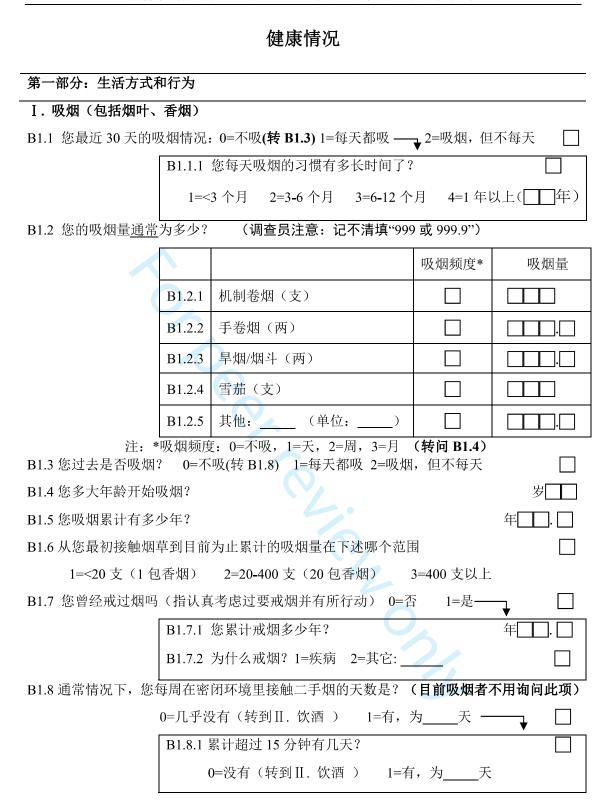
	65-74	24.14	(23.88,24.40)	24.63	(24.35,24.92)
	75+	23.63	(23.37,23.89)	23.56	(23.24,23.88)
SBP	Total	130.44	(129.99,130.88)	127.36	(126.90,127.81)
	15-24	122.45	(121.67,123.24)	116.81	(116.13,117.50)
	25-34	124.43	(123.77,125.08)	117.93	(117.28,118.58)
	35-44	128.76	(127.85,129.67)	123.85	(122.95,124.75)
	45-54	134.69	(133.51,135.87)	132.39	(131.28,133.49)
	55-64	137.56	(136.22,138.91)	139.53	(138.17,140.90)
	65-74	143.98	(142.25,145.71)	145.16	(143.55,146.76)
	75+	143.69	(141.96,145.42)	143.44	(141.60,145.28)
DBP	Total	78.14	(77.84,78.43)	75.45	(75.19,75.71)
	15-24	70.98	(70.43,71.53)	69.35	(68.82,69.88)
	25-34	76.13	(75.63,76.63)	72.69	(72.25,73.13)
	35-44	79.04	(78.42,79.66)	75.47	(74.91,76.03)
	45-54	81.24	(80.51,81.96)	78.41	(77.79,79.03)
	55-64	82.50	(81.67,83.33)	79.87	(79.15,80.60)
	65-74	81.56	(80.72,82.40)	79.13	(78.35,79.91)
	75+	80.38	(79.61,81.15)	79.26	(78.41,80.11)

CI: confidence interval

80.38 (79.61,81.15) 79.26 (78.41,80.11)

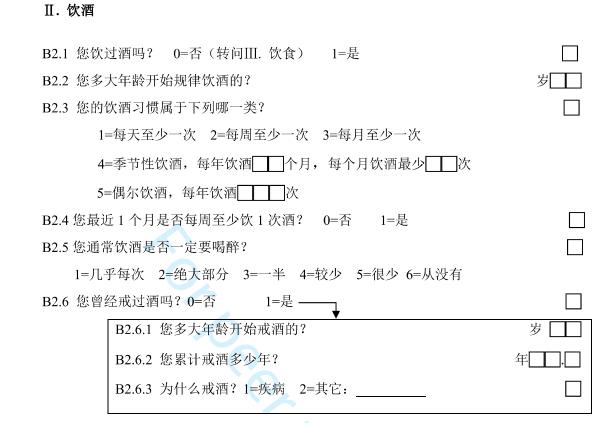
	ì市	区/县	居/村委会	ID 号:	
A2 姓名: _				A3 性别: 1=	男 2=女 🗌
A4 出生日	期:			——————————————————————————————————————	□月□□日
A5 身份证	号:				
A6 工作单	位(或村)及	部门:			
A7 家庭详	细住址:				
A8 电话:		(家)	( <i>ī</i>	办公室)	(手机)
A9 联系人	姓名:		A10	) 与本人关系:	
A11 联系人	工作单位:_	_			
A12 联系人	、住址:	-			
A13 联系人	、电话:	10	_(家)	(办公室)	(手机)
A14 民族:					
1 汉族	2蒙古族	3回族 4 新	<b>蔵族 5</b> 维吾尔族	<b>6</b> 苗族 7 彝族	8 壮族
	医 10 西磁波				
9 布依於	大 10 朝軒族	11 满族 12	2 侗族 13 瑶族	14 白族 15 土家游	矢 16 哈尼族
				14 白族     15 土家彦       〔注明〕	5 16 哈尼族
17 哈萨	克族 18 傣	族 19黎族	20 其它民族(		
17 哈萨 A15 文化程	克族 18 傣 程度: 1=未上	族 19 黎族 二学 2=小学 3	20 其它民族(	(注明) 专 5=大学 6=研究生	失 16 哈尼族
17 哈萨 A15 文化程 A16 婚姻状	克族 18 傣 星度: 1=未上 代况: 0=未タ	族 19 黎族 :学 2=小学 3 婚 1=已婚/再9	20 其它民族 ( =初中 4=高中/中 碈/同居 2=分居 3	(注明) 专 5=大学 6=研究生	失 16 哈尼族
17 哈萨 A15 文化程 A16 婚姻为 A17 所享受	克族 18 傣 星度: 1=未上 代况: 0=未タ	族 19 黎族 :学 2=小学 3 婚 1=已婚/再 川度:(多选,	20 其它民族 ( =初中 4=高中/中 婚/同居 2=分居 3 有在方框中填 1,	〔注明) 专 5=大学 6=研究生 =离异 4=丧偶	失 16 哈尼族
17 哈萨 A15 文化種 A16 婚姻状 A17 所享受 1=城镇I	克族 18 傣 呈度: 1=未上 代况: 0=未 的医疗保障制	族 19 黎族 :学 2=小学 3 婚 1=已婚/再续 川度:(多选,	20 其它民族 ( =初中 4=高中/中 碈/同居 2=分居 3 有在方框中填 1, 合 🔲 3=城镇	<ul> <li>(注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>④</li> </ul>	失 16 哈尼族
17 哈萨 A15 文化種 A16 婚姻却 A17 所享受 1=城镇I 4=商业[	克族 18 傣 建度: 1=未上 代况: 0=未 的医疗保障制 职工医疗保险 医疗保险	族 19 黎族 :学 2=小学 3 婚 1=己婚/再 □ (多选, □ 2=新农 □ 5=公费	20 其它民族 ( =初中 4=高中/中 碈/同居 2=分居 3 有在方框中填 1, 合 🔲 3=城镇	<ul> <li>(注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>眞居民医疗保险□</li> <li>Ц□</li> </ul>	失 16 哈尼族
17 哈萨 A15 文化種 A16 婚姻却 A17 所享受 1=城镇I 4=商业[ A18 就业状	克族 18 傣 程度: 1=未上 代况: 0=未 的医疗保障制 职工医疗保险 医疗保险 无疗保险	族 19 黎族 :学 2=小学 3 婚 1=己婚/再 □ (多选, □ 2=新农 □ 5=公费	20 其它民族 ( =初中 4=高中/中 碈/同居 2=分居 3 有在方框中填 1, 合 3=城辑 医疗 6=其他 3=在校学生 4=	<ul> <li>(注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>眞居民医疗保险□</li> <li>Ц□</li> </ul>	<ul> <li>失 16 哈尼族</li> <li>□</li> <li>□</li></ul>
17 哈萨 A15 文化種 A16 婚姻状 A17 所享受 1=城镇I 4=商业[ A18 就业状 A19 职业(	克族 18 傣 建度: 1=未上 式况: 0=未対 的医疗保障制 职工医疗保险 医疗保险 流: 1=在业 当前,包括返	<ul> <li>族 19 黎族</li> <li>:学 2=小学 3</li> <li>婚 1=已婚/再好</li> <li>问度: (多选,</li> <li>□ 2=新农</li> <li>□ 5=公费</li> <li>2=离退休 3</li> <li>聘者当前职业</li> </ul>	20 其它民族 ( =初中 4=高中/中 碈/同居 2=分居 3 有在方框中填 1, 合 3=城辑 医疗 6=其他 3=在校学生 4=	<ul> <li>注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>每居民医疗保险□</li> <li>4</li> <li>□</li> <li>无业或失业</li> </ul>	
17 哈萨 A15 文化種 A16 婚姻为 A17 所享受 1=城镇I 4=商业I A18 就业状 A19 职业( 1=机关、	克族 18 傣 建度: 1=未上 式况: 0=未対 的医疗保障制 职工医疗保险 医疗保险 流: 1=在业 当前,包括返	<ul> <li>族 19 黎族</li> <li>:学 2=小学 3</li> <li>婚 1=已婚/再经</li> <li>问度:(多选,</li> <li>□ 2=新农:</li> <li>□ 5=公费</li> <li>2=离退休 3</li> <li>聘者当前职业</li> <li>单位管理者</li> </ul>	20 其它民族 ( =初中 4=高中/中 婚/同居 2=分居 3 有在方框中填 1, 合 [] 3=城镇 医疗[] 6=其他 3=在校学生 4=	<ul> <li>(注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>④</li> <li>⑤</li> <li>④</li> <li>五业或失业</li> <li>▲</li> <li>3=一般办事人员</li> </ul>	□ □ 和有关人员
17 哈萨 A15 文化種 A16 婚姻却 A17 所享受 1=城镇I 4=商业I A18 就业状 A19 职业( 1=机关、 4=商业、	克族 18 傣 建度: 1=未上 代况: 0=未禁 的医疗保障制 职工医疗保险 医疗保险 完況: 1=在业 当前,包括返 、企业、事业	<ul> <li>族 19 黎族</li> <li>:学 2=小学 3</li> <li>语 1=已婚/再約</li> <li>问度: (多选,)</li> <li>□ 2=新农:</li> <li>□ 5=公费</li> <li>2=离退休 3</li> <li>聘者当前职业</li> <li>单位管理者</li> </ul>	20 其它民族 ( =初中 4=高中/中 婚/同居 2=分居 3 有在方框中填 1, 合 3=城键 医疗 6=其他 3=在校学生 4= 2=专业技术人员 5=个体工商户	<ul> <li>(注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>④</li> <li>④</li> <li>①</li> <li>无业或失业</li> <li>③</li> <li>3=一般办事人员</li> </ul>	□ □ 和有关人员
17 哈萨 A15 文化種 A16 婚姻切 A17 所享受 1=城镇I 4=商业[ A18 就业状 A19 职业( 1=机关、 4=商业、 7=从事	克族 18 傣 建度: 1=未上 代况: 0=未刻 的医疗保障制 取工医疗保险 医疗保险 二次: 1=在业 当前,包括返 、企业、事业 、服务业人员 非农业劳动的	<ul> <li>族 19 黎族</li> <li>注学 2=小学 3</li> <li>语 1=已婚/再刻</li> <li>问度: (多选,)</li> <li>□ 2=新农:</li> <li>□ 5=公费</li> <li>2=离退休 3</li> <li>聘者当前职业</li> <li>单位管理者</li> <li>农民</li> </ul>	20 其它民族 ( =初中 4=高中/中 婚/同居 2=分居 3 有在方框中填 1, 合 3=城镇 医疗 6=其他 3=在校学生 4= 2) 2=专业技术人员 5=个体工商户 8=农业劳动者	<ul> <li>注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>每居民医疗保险□</li> <li>4</li> <li>□</li> <li>无业或失业</li> <li>3=一般办事人员:</li> <li>6=非农户产业人</li> </ul>	□ □ 和有关人员 员 9=其他
17 哈萨 A15 文化種 A16 婚姻切 A17 所享受 1=城镇耳 4=商业[ A18 就业状 A19 职业( 1=机关、 4=商业、 7=从事 A19.1 如已	克族 18 傣 星度: 1=未上 代况: 0=未结 的医疗保障障 职工医疗保险 医疗保险 法的 1=在业 当前,包括返 、服务业人员 非农业劳动的 离退休,离退	<ul> <li>族 19 黎族</li> <li>注学 2=小学 3</li> <li>语 1=已婚/再刻</li> <li>问度: (多选,)</li> <li>□ 2=新农:</li> <li>□ 5=公费</li> <li>2=离退休 3</li> <li>聘者当前职业</li> <li>单位管理者</li> <li>农民</li> </ul>	20 其它民族 ( =初中 4=高中/中 婚/同居 2=分居 3 有在方框中填 1, 合 □ 3=城镇 医疗□ 6=其他 3=在校学生 4= 2=专业技术人员 5=个体工商户 8=农业劳动者 ( 关同上,未退休	<ul> <li>(注明)</li> <li>专 5=大学 6=研究生</li> <li>=离异 4=丧偶</li> <li>无在方框中填 0)</li> <li>④</li> <li>④</li> <li>①</li> <li>无业或失业</li> <li>3=一般办事人员:</li> <li>6=非农户产业人</li> <li>(从事农林牧渔工作)</li> </ul>	□ □ 和有关人员 员 9=其他





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B2.7 您饮酒的种类和饮酒量(当前饮酒者填当前情况,当前不饮酒者填既往情况):

	饮用频度*	次数**	平均每次饮用量	月数/年	酒精度
B2.7.1 啤酒			, □, □, ſ, ſ,		
B2.7.2 白酒			两		
B2.7.3 葡萄酒			两		
B2.7.4 黄酒			两		
B2.7.5 米酒			两		
B2.7.6 其它酒 注明:			两		
	下饮,1=天,	2=周,3=	=月,4=年 ** 与	频度对应的	的次数

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国家科技支撑计划项目《中国重要心血管病患病率调查及关键技术研究》

# Ⅲ. 饮食(了解您过去一年食用下列食物的频率和食用量)

B3.1 食物	食用频度(选择其中的一种)	食用量
B3.1.1 大米、面粉、杂粮(小米、高粱、 玉米等)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.2 薯类(红薯、山药、芋头、土豆等)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.3 新鲜蔬菜(不包括干菜和咸菜)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.4 畜肉(猪、牛、羊等)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.5 禽肉(鸡、鸭、鹅等)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.6 鱼类	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.7 虾、蟹、贝等其它水产品	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.8 蛋类(鸡蛋、鸭蛋等)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.9 奶类(折合成鲜奶)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.10 豆制品(以豆腐计)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.11 新鲜水果	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.12 干果(花生、瓜子、核桃)	0=不吃 1=天 2=周 3=月 4=年	□□斤□两
B3.1.13 咸菜/泡菜/腌菜	0=不吃 1=天 2=周 3=月 4=年	□□斤□两

# B32 请请写你最近一个日在下述地占的就努次数

B3.2 谊垺	具与您最近 <b>一个月</b> 在下	·还地点的就餐伏数		
	餐次	家	单位食堂	餐馆或街头
B3.2.1	早餐	早餐 🗌 🗌		
B3.2.2	午餐			
B3.2.3	晚餐	晚餐 🔲 🔲		
B3.3 您家	<b>采通常有多少人在一起</b>			
B3.4 其中	96岁及以下的人数?			
B3.5 您家	《通常每个月吃多少斤		斤/月	
B3.6 您家	《通常每个月吃多少斤		斤/月 🔲 🗌	
B3.7 您家	<b>买通常每个月吃多少</b> 斤	盐?		斤/月 🔲 🛄

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# Ⅳ.体力活动

		宫友 六语相关故真体活击
	过是通常一周您进行各类身体活动(包括干农活、工作、	,豕务、父迪相大的身体活动、
	》炼或运动等)的情况。	
В4.1 ⊥	工作、农业及家务性身体活动	
	在您的工作、农活及家务活动中,有没有 <u>高强度</u>	
	<u>活动</u> ,并且活动时间持续 <u>10分钟以上</u> ?	
B4.1.1	(高强度活动是指如搬运重物、挖掘等需要付出	1=有 2=没有(转 B4.1.4)
	较大体力,或引起呼吸、心跳显著增加的活动)	
	调查员注意:可出示身体活动分类表	
B4.1.2	在您的工作、农活及家务活动中,通常一周内有	□天
D7.1.2	多少天会进行上述高强度活动?	
	在您的工作、农活及家务活动中,通常一天内累	
B4.1.3	<u>计</u> 有多长时间进行上述高强度活动?	小时一分钟
	(每次活动时间若少于 10 分钟,则不计算在内)	
	在您的工作、农活及家务活动中,有没有中等强	
	<u>度活动</u> ,并且活动时间持续 <u>10分钟以上</u> ?	
D414	(中等强度活动是指如锯木头、洗衣服、打扫卫	1 左 2 汎左 (枯 10 4 2) 🗖
B4.1.4	生等需要付出中等体力,或引起呼吸、心跳轻度	1=有 2=没有(转 B4.2)
	增加的活动)	
	调查员注意:可出示身体活动分类表	
D415	在您的工作、农活及家务活动中,通常一周内有	□天
B4.1.5	多少天会进行上述中等强度活动?	
	在您的工作、农活及家务活动中,通常一天内累	5
B4.1.6	<u>计</u> 有多长时间进行上述中等强度活动?	□□小时□□分钟
	(每次活动时间若少于 10 分钟,则不计算在内)	
B4.2 交	<b>通相关的身体活动</b> (以下问题不包括上述已提及的2	<b>牧业性身体活动和工作及家务</b>
性身体活	5动)	
B4.2.1	您在外出时,有没有步行或骑自行车 <u>持续至少10</u>	1=有 2=没有(转 B4.3)
D7.2.1	<u>分钟</u> 的情况?	
B4.2.2	通常一周内,您有多少天外出时步行或骑自行车	□天
D7.2.2	持续至少10分钟?	
B4.2.3	通常一天内,您步行或骑自行车多长时间?	小时一分钟
B4.3 休	闲相关的身体活动(以下问题不包括上述已提及的	农业性、工作、家务和交通相

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国家科拉又崔订划坝日	《中国里安小川官协思协举调官及大键拉木册五》

关的身体;		
	您是否进行 <u>持续至少 10 分钟,引起呼吸、心跳显</u>	
B4.3.1	<u>著增加</u> 的高强度活动吗?( <b>如长跑、踢足球等)</b>	1=有 2=没有(转 B4.3.4)
	调查员注意:可出示身体活动分类表	
B4.3.2	通常一周内,您有多少天进行上述高强度的运动	□天
	或休闲活动?	
B4.3.3	<u>通常一天内</u> ,您累计有多长时间进行上述高强度	
	的运动或休闲活动?	
	您是否进行持续至少10分钟,引起呼吸、心跳轻	
B4.3.4	<u>度增加</u> 的中等强度运动和休闲活动吗? (如快步	
	走、游泳、打排球等)	1-17 2-仅有(将 <b>D4.4</b> )
	调查员注意:可出示身体活动分类表	
	通常一周内,您有多少天进行上述中等强度的运	
B4.3.5	动或休闲活动?	□ □ 天
	通常一天内,您累计有多长时间进行上述中等强	
B4.3.6	度的运动或休闲活动? (调查员注意:每次活动	□□小时□□分钟
	时间若少于10分钟,则不计算在内)	
B4.4 静态	5行为	
-	通常工作日一天内,您累计有多少时间坐着、靠	
B4.4.1	着或躺着? (包括坐着工作、学习、阅读、看电	□□小时□□分钟
	视、用电脑、休息等所有静态行为的时间,但不	
	包括睡觉时间)	
	通常非工作日一天内,您累计有多少时间坐着、	3
B4.4.2	靠着或躺着? (包括坐着学习、阅读、看电视、	□□小时□□分钟
	用电脑、休息等所有静态行为的时间,但 <u>不包括</u>	
	工作和睡觉时间)	
B4.5 睡眼	民行为	L
B4.5.1	通常工作日一天内,您睡觉累计有多少时间?	小时一分钟
B4.5.2	通常非工作日一天内,您睡觉累计有多少时间?	小时一分钟

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第二部分:个人疾病9	1					
C1 您上次测量血压到现在	有多长时间了	? 0=从き	未 99=	不知道	年	Ē
C1.1 您是否被诊断为高						
0=无 (转问 C2) 1	=有 ───_					
C1.1.1 您患高血压	有多少年了?				白	Ξ[
C1.1.2 最高诊断单	立级别 1=区	/县级以下	2=区/县	县级 3=区/-	县级以上	
C1.1.3 您近一年服	<b> 哥降压药的情</b> (	兄? 0=才	「服	1=偶服	2=经常服	
C1.1.4 您两周内服						[
C1.1.5 您目前服用						
C1.1.6 是否接受高」 C2 您是否被诊断为患过心		0=省	· _	三是	9=个许	L
0=无(转问 C3)		SV-6)		9=不详	(转间C3	)
	Ľ.	~~~~)	↓			
C2.1 首次发病日期						年
C2.2 最高诊断单位	级别 1=区/县	县级以下 2	是一区/县约	及 3=区/县约	级以上	
C3 您是否接受过冠脉血管	<b></b>	直入?				
0=无(转问 C4)	1=有(填写表	SV-7) —	<b>_</b>	9=不详	(转问 C4	)
C3.1 首次治疗日期		~				年
C3.2 最高诊治单位	级别 1=区/县	县级以下 2	2=区/县约	及 3=区/县约	级以上	Γ
C4 您是否接受过冠状动脉	<b>亲路</b> 塔桥手术?	,				
0=无(转问 C5)				9=不详	(转问 C5 )	L
	<b>`</b>	. 5 (-8)	<b>↓</b>	у т. <del>и</del>	(14) (15)	
C4.1 首次治疗日期						年
C4.2 最高诊治单位	级别 1=区/县	县级以下 2	2=区/县约	及 3=区/县约	级以上	
C5 您是否被诊断为患有脑	中风 (脑卒中)	?				Γ
0=无(转问 D1)	1=有(填写表	: SV-9) —		9=不详	(转问 D1	)
			+			
C5.1 首次发病日期						年
C5.2 最高诊断单位	级别 1=区/县	县级以下 2	=区/县约	及 3=区/县约	级以上	
C5.3 是否能够独立	完成下列事情	(不需要他	2人帮助	) 0=	不能 1=	能
	中风前	目前			中风前	目前
C5.3.1 吃饭、饮水			C5.3.5	上厕所		
C5.3.2 洗漱梳头			C5.3.6	洗澡		
C5.3.3 穿脱衣服			C5.3.7	室内活动		
C5.3.4 上下床						

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# 第三部分:家族史

D1 您是否有如下疾病家族史?

0=无 1=有 9=不详(兄弟姐妹不包括本人)

\$ 78 - 11 >				
	父	母:	兄弟姐妹	子女
D1.1 高血压				
D1.2 高血脂				
D1.3 糖尿病				
D1.4 脑卒中				
D1.5 冠心病				

#### D2 您是否有早发心血管病家族史(发病年龄:男性<55 岁,女性<65 岁)? 0=无 1=有 9=不详(兄弟姐妹不包括本人)

· / · · · · · · ·				
	父	母:	兄弟姐妹	子女
D2.1 高血压				
D2.2 高血脂				
D2.3 糖尿病				
D2.4 脑卒中				
D2.5 冠心病				

### D3 您目前仍在世的家庭成员中是否有以下年龄组者?请标明,0=否,1=是。

D3 芯口的 M 正臣								
	祖父	祖母	外祖父	外祖母	父	母	兄弟	姐妹
D3.1 80~85 岁								
D3.2 85~90 岁								
D3.3 ≥90 岁								

2	
3	第四部分:月经史及生育史(只问女性)
4	第四部 <b>分:</b> 月经文及生肖文(六问文性)
5	
6 7	E1 您月经来潮年龄
8 9	E2 您是否已绝经?
10 11	0=否 1=是 ───
12 13	E2.1 您多大岁数绝经的?
14	E2.2 您是否使用雌激素替代?
15 16	0=否 1=现在服 2=过去服,现在不服
17 18	E3 您服用过避孕药吗? 0=否 1=是
19 20	E3.1 您服用避孕药累计有多长时间?
21 22	
23	E4 您怀孕过吗(包括当前怀孕者)? 0=否 1=是       □         E4.1 您怀孕过多少次?       99=不详       次□
24 25	
26 27	E4.2 您活产婴儿数量?       个         E4.3 您现在是否怀孕?       0=否 1=是
28	E4.3 您现在是否怀孕?       0=否       1=是          E4.4 您有过哺乳经历吗?       0=否       1=是
29 30	E4.4 您有过哺乳经历吗: 0-否 1-是
31 32	E4.3 忽现住定省正任哺乳: 0-百 1-定
33	
34 35	
36 37	
38	
39 40	询问者编码:
41 42	填表日期: 年月月日日
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国家科技支撑计划项目	《中国重要心	血管病患病率调	查及关键技术研究》

国家科技支撑计划项目《中国重	這要心血管病患病率调查及关键技	乏术研究》
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H3 腰围 []]. 厘米		
H4 体脂测定		
H4.1 基础代谢	H4.2 身体脂肪率	
H4.3 内脏脂肪指数		
		测量者编码:
0		
H5 静息 60 秒脉搏 次/60 秒		
H6外周血压(mmHg)(每50人需同时用		
电子血压计: 收缩压 舒张压	<b>汞柱血压计</b> : 收缩压	舒张压
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	第二次 1	
第三次 []]	第三次	」/□□□□ 测具夹炉刀 □□
	4.	测量者编码:
	填表日期:	年月

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8 9	二、血压	0=未完成	1=已完成	
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## STROBE Statement-checklist of items that should be included in reports of observational studies

	Item No	Recommendation	
Title and abstract	1	( <i>a</i> ) Indicate the study's design with a commonly used term in the title or	the abstra P1·
		(b) Provide in the abstract an informative and balanced summary of what	was done
		and what was found	P2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation bei	ng reporte I
Objectives	3	State specific objectives, including any prespecified hypotheses	P
Methods			
Study design	4	Present key elements of study design early in the paper	P4-5
Setting	5	Describe the setting, locations, and relevant dates, including periods of rec	
Seving		exposure, follow-up, and data collection	P4-:
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and method	
I I I I I		selection of participants. Describe methods of follow-up	
		<i>Case-control study</i> —Give the eligibility criteria, and the sources and meth	nods of
		case ascertainment and control selection. Give the rationale for the choice	
		and controls	
		Cross-sectional study—Give the eligibility criteria, and the sources and m	ethods of
		selection of participants	P4
		(b) Cohort study—For matched studies, give matching criteria and number	
		exposed and unexposed	
			number of
		Case-control study—For matched studies, give matching criteria and the m	number of
Variables	7	<i>Case-control study</i> —For matched studies, give matching criteria and the n controls per case	
Variables	7	Case-control study—For matched studies, give matching criteria and the m controls per case Clearly define all outcomes, exposures, predictors, potential confounders,	and effec
		Case-control study—For matched studies, give matching criteria and the n controls per case Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable	and effec P
Data sources/	7 8*	Case-control study—For matched studies, give matching criteria and the m controls per case Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable For each variable of interest, give sources of data and details of methods of	and effec
		Case-control study—For matched studies, give matching criteria and the n controls per case Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods	and effec P of s if there
Data sources/		Case-control study—For matched studies, give matching criteria and the m controls per case Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group	and effec Pe of s if there
Data sources/ measurement	8*	Case-control study—For matched studies, give matching criteria and the n controls per case Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods	and effec P of s if there 1
Data sources/ measurement Bias	8*	Case-control study—For matched studies, give matching criteria and the n         controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at	and effec P of s if there I I
Data sources/ measurement Bias Study size	8* 9 10	Case-control study—For matched studies, give matching criteria and the montrols per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If application	and effec P of s if there 1 1 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Data sources/ measurement Bias Study size	8* 9 10	Case-control study—For matched studies, give matching criteria and the n         controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at	and effec P of s if there l l able, P5- onfoundi
Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the montrols per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If application describe which groupings were chosen and why         (a) Describe all statistical methods, including those used to control for c	and effec P of s if there I able, P5- onfoundi
Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the n controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If applicat describe which groupings were chosen and why         (a) Describe any methods used to examine subgroups and interactions	and effec Prof s if there I able, P5- onfoundi
Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the n controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If applicated describe which groupings were chosen and why         (a) Describe any methods used to examine subgroups and interactions         (c) Explain how missing data were addressed	and effec Prof s if there I able, P5- onfoundir I I I I
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Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the n controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If applicated describe which groupings were chosen and why         (a) Describe any methods used to examine subgroups and interactions         (c) Explain how missing data were addressed         (d) Cohort study—If applicable, explain how loss to follow-up was address Case-control study—If applicable, explain how matching of cases and complexity.	and effec Prof s if there I able, P5- onfoundii I I ssed
Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the n controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If applicate describe which groupings were chosen and why         (a) Describe all statistical methods, including those used to control for c         (b) Describe any methods used to examine subgroups and interactions         (c) Explain how missing data were addressed         (d) Cohort study—If applicable, explain how loss to follow-up was address Case-control study—If applicable, explain how matching of cases and con addressed	and effec Prof s if there I able, P5- onfoundi I sed trols was
Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the n         controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If applicad describe which groupings were chosen and why         (a) Describe all statistical methods, including those used to control for c         (b) Describe any methods used to examine subgroups and interactions         (c) Explain how missing data were addressed         (d) Cohort study—If applicable, explain how matching of cases and con addressed         Case-control study—If applicable, describe analytical methods taking a	and effec Prof s if there I able, P5- onfoundii I ssed trols was ccount of
Data sources/ measurement Bias Study size Quantitative variables	8* 9 10 11	Case-control study—For matched studies, give matching criteria and the n controls per case         Clearly define all outcomes, exposures, predictors, potential confounders, modifiers. Give diagnostic criteria, if applicable         For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods more than one group         Describe any efforts to address potential sources of bias         Explain how the study size was arrived at         Explain how quantitative variables were handled in the analyses. If applicate describe which groupings were chosen and why         (a) Describe all statistical methods, including those used to control for c         (b) Describe any methods used to examine subgroups and interactions         (c) Explain how missing data were addressed         (d) Cohort study—If applicable, explain how loss to follow-up was address Case-control study—If applicable, explain how matching of cases and con addressed	and effec Provide the provided and the

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Results			
Participants	13*	(a) Report numbers of individuals at each stage of study-eg numbers potentially elig	gible,
		examined for eligibility, confirmed eligible, included in the study, completing follow	-up, and
		analysed	P7
		(b) Give reasons for non-participation at each stage	P7
		(c) Consider use of a flow diagram	N/A
Descriptive	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and in	formation
data		on exposures and potential confounders	P7
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Cohort study-Report numbers of outcome events or summary measures over time	
		Case-control study-Report numbers in each exposure category, or summary measur	es of
		exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	P7
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and t	heir
		precision (eg, 95% confidence interval). Make clear which confounders were adjuste	d for and
		why they were included	P8
		(b) Report category boundaries when continuous variables were categorized	P6
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a n	eaningful
		time period	N/A
Other analyses	17	Report other analyses done-eg analyses of subgroups and interactions, and sensitivi	ty
		analyses	P8-9
Discussion			
Key results	18	Summarise key results with reference to study objectives	P10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or impr	ecision.
		Discuss both direction and magnitude of any potential bias	P15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, m	ultiplicity
		of analyses, results from similar studies, and other relevant evidence	P10-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	P15
Other informati	on		
Funding	22	Give the source of funding and the role of the funders for the present study and, if ap	plicable,
-		for the original study on which the present article is based	P19

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\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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# **BMJ Open**

# **Prevalence and distribution of hypertension and related risk factors in Jilin Province, China 2015: a cross-sectional study**

Journal:	BMJ Open
Manuscript ID	bmjopen-2017-020126.R2
Article Type:	Research
Date Submitted by the Author:	15-Feb-2018
Complete List of Authors:	Wu, Junduo; the Second Hospital of Jilin University, cardiology Li, Tianyi; the Second Hospital of Jilin University, cardiology Song, Xianjing; the Second Hospital of Jilin University, cardiology Sun, Wei; the Second Hospital of Jilin University, cardiology Zhang, Yangyu; School of Public Health, Jilin University, Department of Epidemiology and Biostatistics Liu, Yingyu; School of Public Health, Jilin University, Department of Epidemiology and Biostatistics Liu, Yingyu; School of Public Health, Jilin University, Department of Epidemiology and Biostatistics Li, Longbo; the Second Hospital of Jilin University, cardiology Yu, Yunpeng; the Second Hospital of Jilin University, cardiology Liu, Yihang; the Second Hospital of Jilin University, cardiology Qi, Chao; the Second Hospital of Jilin University, cardiology Liu, Bin; The Second Hospital of Jilin University, Department of Cardiology
<b>Primary Subject Heading</b> :	Epidemiology
Secondary Subject Heading:	Public health
Keywords:	prevalence, Hypertension < CARDIOLOGY, EPIDEMIOLOGY, China

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4	1	Prevalence and distribution of hypertension and related risk
5 6 7	2	factors in Jilin Province, China 2015: a cross-sectional study
8	3	
9 10	4	Junduo Wu <sup>1</sup> , Tianyi Li <sup>1</sup> , Xianjing Song <sup>1</sup> , Wei Sun <sup>1</sup> , Yangyu Zhang <sup>2</sup> , Yingyu Liu <sup>2</sup> ,
11 12	5	Longbo Li <sup>1</sup> , Yunpeng Yu <sup>1</sup> , Yihang Liu <sup>1</sup> , Chao Qi <sup>1</sup> , Bin Liu <sup>1*</sup>
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16 17	7	
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41 42	17	*Corresponding author E-mail address: liubin3333@vip.sina.com
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18	Abstract
19	Objective: This study aimed to investigate the prevalence and distribution of
20	hypertension and its related factors in Jilin province, China.
21	Design: A cross-sectional study in four cities and four rural counties in Jilin as part of
22	a national Chinese study.
23	<b>Participants and setting:</b> A total of 15206 participants who were $\geq$ 15 years old
24	and were selected using a stratified multistage random sampling method.
25	Main outcome measures: The prevalence of hypertension.
26	Results: The prevalence of hypertension in Jilin province was 24.7%. Moreover, the
27	prevalence of hypertension increased with age in both sexes, and was higher in males
28	than in females. The modifiable factors that were associated with hypertension were
29	body mass index, smoking, and alcohol drinking. The risk factors identified are
30	similar to those in southern China, except smoking, which has no association with
31	hypertension prevalence in the South.
32	Conclusions: Age, sex, body mass index, smoking, and alcohol drinking were risk
33	factors of hypertension. Control of these related risk factors, especially smoking, may
34	be helpful in the treatment and management of hypertension in Jilin province.
35	
36	Strength and limitations of this study
37	This cross-sectional population-based study evaluated a large representative
38	sample of individuals from four cities and four rural counties in Jilin province.
39	A large sample of participants allowed for subgroups analysis of related factors.
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#### **BMJ** Open

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7, 8]. There are about 109.4 million	4, 2025 nologie
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The causality of the relationships between h cannot be confirmed. Data were not collected regarding physical a levels. Key words Prevalence, hypertension, epidemiology, China 

Introduction 

A recent World Health Organization report in (CVD) are at the top of the list of the four price worldwide, and that they require immediate glo control [1]. Hypertension is a leading cause of deaths worldwide [2, 3]. It is estimated that the hypertension could be as high as US\$ 370 billion 

In the People's Republic of China, the pr increasing dramatically from 5.1% in 1959, to 7.7 in 2002 [5, 6]. Furthermore, there is a disproper reported among people living in northern China people in the northeastern China. The province of China, with a population of approximately 27.5 Bureau of Statistics. Similar to other northern 

62	season than the southern China, and, limited by this environment, the lifestyle of the
63	people is different from the other parts of the country.
64	An in-depth analysis of data from Jilin province regarding hypertension and its
65	risk factors would improve our understanding of the differential reasons for
66	hypertension in the North. Moreover, the analysis would assist in the development of
67	locally effective intervention and control strategies for this preventable disease. Thus,
68	the objectives of this study were: to estimate the prevalence of hypertension in Jilin
69	province and to explore potential risk factors that are associated with hypertension in
70	the province. This will provide information for making recommendations on the
71	prevention and control of hypertension in the northern region of China.
72	
73	Methods
74	Study population
75	This cross-sectional study was conducted between July 2014 and December 2015
76	as a part of national China study. A 4-stage, stratified sampling method was used to
77	select participants who were aged 15 years and older from the general population of
78	Jilin province, China. First, four cities from the urban areas and four counties from
79	rural areas were selected using a probability proportional to size. Then two districts or
80	two townships were selected in each city or county using simple random sampling
81	(SRS). Next, in each district and township, three communities or villages were chosen
82	manualization of SDS Finally marticipants startified has see (500/ manual 500/
	respectively using SRS. Finally, participants stratified by sex (50% men and 50%
83	women) and age (aged 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, , 65-74, $\geq$ 75 years)

were chosen using SRS according to the national population composition. Participants were chosen from the list provided by the local government registers of households [9]. Based on a design effect of 2.5 and assuming a prevalence of hypertension of 17.7% among the population aged 15 years and older, an estimated sample size of 15,200 participants was needed to ensure that the bound on the error of estimation (i.e. width of the 95% confidence interval (CI)) for the prevalence in the entire population and subpopulation defined by age and sex were less than 0.4% and 1.8%, respectively [9]. As a result, a total of 15,206 participants living in Jilin province over 6 months and aged 15 years and older were randomly selected to participate in the survey. Measurement The survey involved a questionnaire interview and physical examination. The standardized questionnaire was developed by the national coordinating center of Fuwai Hospital (Beijing, China) and included questions on demographic characters, 

99 health behaviors and physical activities. The questionnaire was completed by the100 participants in a face-to-face interview with trained staff.

101 The physical examination evaluated blood pressure (BP), body weight and height. 102 BP was measured at the right arm supported at the heart level after participants resting 103 for five minutes, using the Omron HBP-1300 Professional Portable Blood Pressure 104 Monitor (OMRON, Japan). BP was measured three times, with 30 seconds between 105 each measurement. The average of three readings was used for further analysis [10].

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Body weight, basal metabolism (BM), body fat percentage (BFP) and visceral fat index (VFI) were measured without heavy clothing using an OMRON body fat and weight measurement device (Vbody HBF-371, OMRON, Japan). Height was measured without shoes using a standard right-angle device and a fixed measurement tape (to the nearest 0.5 cm). 

- Definitions

Hypertension was defined as systolic BP (SBP)≥140mmHg or diastolic BP (DBP)≥90mmHg, or self-reported use of antihypertensive medication [11]. Body mass index (BMI) was calculated as kg/m<sup>2</sup>. Overweight was defined as BMI 25-30kg/m<sup>2</sup>, and obesity was defined as BMI>30kg/m<sup>2</sup>. 

#### **Statistical analysis**

Data was entered and validated using Epidata<sup>®</sup> 3.0 software[12]. All estimates and analyses were weighted to represent the population in Jilin Province aged 15 years or older. The weights were calculated based on the 2010 Jilin province population census data, as well as the sampling age, sex and geographic subgroups. Continuous data were presented as mean  $\pm$  standard deviation (SD) or mean with 95% confidence intervals (CI), and differences between groups were compared using the t-est. Categorical data were presented as frequency, rate and 95% CI, and the prevalence between different groups was compared using the corrected Rao-Scott chi-square test. Logistic regression analysis was conducted assessing the relationship 

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128	of hypertension with age, sex, obesity, smoking, and alcohol drinking adjusted for
129	demographic factors, that have been included in similar studies, including sex, region,
130	age, education level, employment status, marital status, BMI, and family history of
131	hypertension. All analyses were conducted using SPSS® 18.0 software[13].
132	
133	Results
134	Distribution of participants
135	A total of 14,956 participants from 15,206 eligible participants (6,946 males and
136	8,010 females; aged 15-97 years) completed the survey and were included in the
137	statistical analysis. The percentages of male and female respondents were 50.63% and
138	49.37%, respectively. The non-responders (1.6%) were mainly young people, and
139	their non-response was likely attributable to their busy work schedule.
140	
141	Characteristics of participants
142	The average age of the participants was 45.5 years, with the average age for
143	males being $45.6 \pm 19.6$ years and for females $45.5 \pm 18.9$ years. There was no
144	statistically significant difference in age between the sexes (p=0.92). The distribution
145	of participants by age and sex are shown in Table 1. The participants had average
146	values of 24.01 $\pm$ 3.67 kg/m <sup>2</sup> for BMI, 1,397.47 $\pm$ 244.15 for BM, 26.20 $\pm$ 8.4 for BFP,
147	and 8.54 $\pm$ 4.99 for VFI. The mean SBP was 128.92 $\pm$ 17.97 mmHg, and the mean
148	DBP was $76.81 \pm 10.36$ mmHg. These physical characteristics by age and sex are
149	shown in Supplementary Table 1. All these characters were statistically significantly

different between males and females (p<0.01). In particular, male participants had</li>
higher BM and VFI values than female participants in all age groups (Figure 1A, 1B),
while female participants had higher BFP values in all age groups (Figure 1C). BMI
reached its highest value for males in the 35-44 year age group and for females in the
55-64 year age group (Figure 1D). The SBP was similar between males and females
in all age groups (Figure 1E), although male participants had higher DBP values in all

The overall prevalence of overweight and obesity of participants was 29.8% and 6.2%, respectively. Male participants had a higher prevalence of overweight than female participants (30.9% vs. 28.7%, p = 0.013). No statistical difference was observed in the prevalence of obesity among male and female participants (6.3% vs.)6.2%, p = 0.78). The overall percentages of current smoking and ever smoking were 22.7% and 1.4%, respectively. When stratified by sex, the percentage of current smoking in males (36.9%) was significantly higher than that in females (8.2%)(p<0.001). Similarly, the percentage of ever smoking in males (2.3%) was significantly higher than that in females (0.5%) (p<0.001). The overall percentage of alcohol drinking was 17.6%. The percentage in males (32.0%) was significantly higher than in females (2.9%) (p<0.001). The risk factors BMI, smoking and alcohol drinking, summarized by age and sex, are shown in Table 2.

#### 170 Prevalence of hypertension stratified by non-modifiable factors-age and sex

Of the 14,956 participants, 4,332 were diagnosed with hypertension, and the

prevalence of hypertension was 24.7% (95% CI: 23.9%, 25.5%). The prevalence of hypertension increased as older ages, and was higher in males (25.6%) than in females (23.8%) (p=0.03), among the age groups under 45 years old, the prevalence of hypertension in males was significantly higher than in females (p<0.001); while for the 65-74 year age group, the prevalence of hypertension in females was higher than in males (p=0.04); and in the other age groups, the prevalence of hypertension in males and females showed no statistical difference (p>0.05). The prevalences of hypertension stratified by age and sex are shown in Table 3. Prevalence of hypertension stratified by modifiable factors-obesity, smoking and alcohol drinking The prevalences of hypertension varifed statisticallybetween the BMI categories (p < 0.001); the highest prevalence being reported was 48.1% in the obese group, followed by the overweight group at 35.7%. The prevalence of hypertension also verified significantly when stratified by smoking (p < 0.001); with the highest 

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#### 193 Factors associated with hypertension

prevalence of 53.1% in the ever smoking group, followed by 32.2% in the current

smoking group and 22.0% in the never smoking group. The prevalence of

hypertension was significantly higher in the alcohol drinking group than in the

no-alcohol drinking group (34.6% vs. 22.6%, p < 0.001). The prevalence of

hypertension stratified by BMI, smoking and alcohol drinking are shown in Table 4.

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194	Several factors, including age, sex, obesity, smoking, and alcohol drinking, are
195	associated with the prevalence of hypertension, in both the crude model and the
196	adjusted logistic model. In particular, the univariate logistic model indicated that the
197	risk of hypertension was greater in males with an OR=1.1 (95% CI: 1.01, 1.2) than in
198	females, overweight partipants with an OR=2.52 (95% CI: 2.3, 2.77) than in normal
199	participants, obese participants with an OR=4.21 (95% CI: 3.56, 4.96) than in normal
200	participants, smokers with OR=1.64 (95% CI: 1.48, 1.81) than in non-smokers, and
201	alcohol drinkers with OR=1.81 (95% CI: 1.62, 2.02) than in non-alcohol drinkers. All
202	the difference were statistically significant (p<0.05). After adjustment for age, sex,
203	region, education level, employment status, BMI, family history of hypertension, and
204	marital status that may affect hypertension, the risk of hypertension was greater in
205	males with an adjusted OR=1.26 (95% CI:1.13, 1.39) than in females, in overweigh
206	participants with an adjusted OR=2.3 (95% CI: 2.06, 2.58) than in normal participants,
207	in obese participants with an adjusted OR=5.11 (95% CI: 4.16, 6.27) than in normal
208	participants, in smokers with an adjusted OR=1.28 (95% CI: 1.13, 1.46) than in
209	non-smokers, and in alcohol drinkers with an adjusted OR=1.49 (95% CI: 1.28, 1.73).
210	These results are shown in Table 5.

211

212 Discussion

Based on an estimated prevalence of 24.7% for hypertension in Jilin province, approximately 6.8 million residents would be considered hypertensive. At the national level, the prevalence of hypertension in Jilin is comparable to that in Zhejiang

216	province [12]; while the prevalence is lower than in other regions in China, including
217	Jiangxi [13], Inner Mongolia [14], and Macau [15], as well as, lower than the overall
218	prevalence in China [16]. At the global level, the prevalence in Jilin is lower than that
219	in the US and the UK, but is higher than that in Canada [4]. However, there are some
220	limitations in terms of the direct comparisons among these studies, given the varying
221	methods, environments, population genetics, and population age structures.
222	Although the prevalence from the present study is lower than the prevalence form
223	2012 (24.7% vs. 30.8%) [17], it remains unacceptably high in terms of optimal
224	hypertension health in the province. Our study found that the prevalence of
225	overweight and obesity was 29.8% and 6.2%, respectively, which is higher than that
226	reported at the national level of 17.7% and 5.6%, respectively[18]. Several studies
227	have shown that obesity is a risk factor for the development of hypertension[19-21].
228	Obesity can increase hypertension through multiple mechanisms, including insulin
229	resistance, activation of sympathetic nervous system, sodium retention leading to
230	increased renal reabsorption, and activation of the renin-angiotensin system[22]. Thus,
231	the increasing populations of overweight and ovese Jilin residents suggest thepotential
232	risk of future increasing incidence of hypertension. Unfortunately, this modifiable risk
233	factor has exhibited no change in between the report in 2012 and now[17], and the
234	population of overweight and obesity may even beunderestimated, because the
235	standard definitions for overweight and obesity used in our research may be too high
236	for Asian population [23, 24]. Moreover, abdominal obesity can be present in
237	individuals with normal BMI values ( $18.5-24.9$ kg/m <sup>2</sup> ), and some studies have

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indicated that this condition could be a risk factor for hypertension [25, 26]. Thus, as
overweight and ovesity are modifiable risk factors, effective proactive intervention
program could help slow and ultimately reduce the number of individuals with obesity
becoming hypertensive.

Our study found that the overall prevalence of hypertension increased with age in both males and females, especially at ages of 35-74 years. This result supports the hypothesis that age is a risk factor for hypertension [27-30]. An increasing lifespan among the population in Jilin requires a practical and effective hypertension management strategy that targets its aging population. The overall prevalence of hypertension was higher in males than in females. However, the prevalence in females increased more rapidly than in males aged 65-74 years. This may be partially explained by hormonal changes in post-menopausal women and the difference in lifespan between males and females [4, 31]. However, the exact mechanisms need to be explored.

Consistent with previous studies [32, 33], our study also showed that smoking, both current and ever smoking, was associated with an increased risk of hypertension. Smoking can increase blood viscosity, stimulate the adrenergic nervous system, and contribute to the development of both micro-vascular and macro-vascular diseases[34]. Although some studies reported weak associations between smoking and hypertension [13, 20], smoking is still considered a major risk factor worldwide [13, 20, 35-37], Additionally, drinking of alcohol is also a risk factor for hypertension in our study, which is consistent with previous studies [4, 38-40]. These results indicate 

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that some lifestyle changes, such as quitting smoking and reducing or stopping alcohol consumption, should help to reduce the prevalence of hypertension. National studies reported that the prevalence of hypertension is higher in northern China than that in southern China [7, 16]. When comparing the associations between risk factors and hypertension with Zhejiang province located in the South[12], we found that the risk of hypertension with demographic factors, such as age, sex, and region, and clinical factors, such as family history of hypertension and abdominal waist circumference, were similar in Jilin province and in southern China. When it comes to the lifestyle factors, the risk of hypertension with obesity and alcohol drinking were similar, however, there was a marked difference in the modifiable risk factor smoking; in particular, in Jilin province there was a strong association with an adjusted OR=1.28 (95% CI: 1.13, 1.46), whereas no association between smoking and hypertension in southern China was found, with an adjusted OR=1.0 (95% CI: 0.9, 1.1). These findings indicate that smoking cessation programs could help mitigate the prevalence of hypertension in Jilin province. Some social factors including retirement status, marital status, and education level were also different between the North and the South. Of interest, there was a difference on BFP categories. In particular, for category 10-19 for males and 20-29 for females, there was no association between BFP and hypertension in Jilin province with an adjusted OR=0.95 (95%CI: 0.71, 1.27), whereas in this category BFP is protective againt hypertension in south China with an adjusted OR=0.6 (95% CI: 0.5, 0.8). In the range of over 25 for males and over 35 for females, BFP is strongly associated with hypertension in Jilin province 

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282	with an adjusted OR=1.45 (95% CI: 1.07, 1.96), whereas no association was found in
283	the South with an adjusted OR=1.3 (95%CI: 1.0, 1.5). These results indicate that BFP
284	tends to be more of a risk for hypertension in the North compared to the South. High
285	BFP values are associated with increased blood pressure[41, 42], and there may be
286	ethnicity-based differences in the relationship between BFP and BMI [43]. Those
287	results may help explain the region-specific relationships between BFP and
288	hypertension in northern and southern China, although further studies are needed to
289	better understand these relationships.

A survey from 2012 found a prevalence of hypertension of 30.8% [17]. The 290 prevalence of hypertension in our study was lower. This reduction may be related to 291 the following two factors. First, the Jilin government is aware of the damage and 292 293 burdern of hypertension and has increased medical insurance funding (especially for 294 rural residents), from RMB ¥3.9 billion in 2012 to RMB ¥6.4 billion in 2015, according to the statistical bureau of Jilin province. Second, new hypertension 295 guidelines for China were published since 2012, and these guidelines addressed the 296 297 grass-roots management of hypertension [44] and patient education [45]. However, some key modifiable risk factors have exhibited slight negative changes, in particular, 298 299 the trend towards obesity, drinking and smoking. This can be due in part to the Jilin's 300 growing economy, which has increased from a gross domestic product of RMB ¥361.5 billion in 1995, to RMB ¥857.8 billion in 2010, to RMB ¥1.4 trillion in 2015, 301 302 according to the statistical bureau of Jilin province. To reverse these trends will require an effective and workable intervention program to control hypertension by 303

304	incorporating best practices identified in theory and practice. For example, rates of
305	hypertension awareness have greatly improved from 24.4% to 42.6%, and the
306	treatment rates have improved from 20.0% to 24.2% based on national surveys [16].
307	However, the control rate is only 9.3% in comparison with 53% in the USA[4]. One
308	of the challenges is to improve adherence to anti-hypertension drugs.
309	This study was a cross-sectional study and contained a large representative
310	sample. These factors will allow for the generalisation of our findings to residents
311	aged 15 years and over in northern China. However, there are some limitations in this
312	study. First, this is a cross-sectional study design, thus the causality cannot be
313	assumed between the risk factors and hypertension. Second, financial limitations
314	precluded collection of data regarding physical activity, salt intake and blood lipid
315	levels. Third, the decrease of prevalence of hypertension in our study compared with
316	that in 2012 may be related with sampling factor.
317	In summary, the prevalence of hypertension in Jilin province decreased compared
318	with that in 2012, and is lower than the overall prevalence in China. In addition, the
319	study showed that hypertension was associated with age, sex, obesity, smoking and
320	alcohol drinking. In particular, smoking may be responsible for the different
321	prevalences of hypertension in northern and southern China. These factors above,
322	especially smoking, will be important points to control and manage hypertension in
323	Jilin province.
324	
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11	464	Footnotes
12	465	Contributors
13	405	
14	466	BL was involved in the study's design, JW, XS, LL, YY, YL, and CQ collected
15 16	467	the data, YZ and YL performed the statistical analysis, TL, WS, and BL wrote the
17	407	the data, 12 and 12 performed the statistical analysis, 12, w.S, and DL wrote the
18	468	paper. All authors reviewed and approved the final version of the paper.
19	460	
20	469	
21 22	470	Ethics approval
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24	471	This study was approved by the Fuwai Hospital Ethics Review Board.
25	472	
26		
27 28	473	Funding
29	474	This work was supported by the National Key R&D Program in the Twelfth
30		
31	475	Five-year Plan (No. 2011BAI11B01) from the Chinese Ministry of Science and
32	476	Technology and the National Clinical Key Specialty Project.
33 34		
35	477	
36	478	Competing interests
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38 39	479	None declared.
40	480	
41		Data sharing statement
42	481	Data sharing statement
43	482	No additional data are available.
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#### 483 Figure Captions

Figure 1: Trends of physical characteristics by age and sex. (A) basal metabolism BM
(B) body fat percentage - BFP (C) visceral fat index - VFI (D) body mass index - BMI
(E) systolic blood pressure - SBP (F) diastolic blood pressure - DBP

**Table 1:** Distribution of participants by age and sex in Jilin province (N, %)

٨٩٩	М	ale	Fer	nale	Тс	tal
Age	Ν	%	Ν	%	Ν	%
15-24	1120	9.07	1146	8.51	2266	17.59
25-34	1316	8.91	1520	8.52	2836	17.43
35-44	1084	11.95	1359	11.40	2443	23.35
45-54	1043	10.02	1333	9.68	2376	19.70
55-64	950	6.36	1121	6.47	2071	12.83
65-74	755	3.01	823	3.23	1578	6.24
75+	678	1.31	708	1.55	1386	2.86
Total	6946	50.63	8010	49.37	14956	100.0

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				Smoking				
	<18.5	18.5-25.0	25.0-30.0	>30.0	Current	Ever	Never	Alcohol Drinkin
Male								
15-24	13.33	67.57	14.85	4.25	6.95	0.36	92.69	5.80
	(11.11,15.91)	(64.24,70.73)	(12.58,17.46)	(3.03,5.93)	(5.47,8.80)	(0.10,1.22)	(90.79,94.22)	(4.62, 7.26)
25-34	2.80	57.76	31.36	8.08	39.19	0.64	60.17	29.70
	(1.98,3.93)	(54.70,60.77)	(28.57,34.30)	(6.52,9.96)	(36.20,42.26)	(0.30,1.37)	(57.09,63.17)	(26.96, 32.60)
35-44	1.89	54.86	35.26	7.99	46.92	1.32	51.76	39.90
	(0.18,3.01)	(51.49,58.18)	(32.10,38.55)	(6.35,10.02)	(43.57,50.30)	(0.79,2.18)	(48.39,55.12)	(36.62, 43.26)
45-54	1.56	55.63	36.25	6.56	48.42	3.19	48.38	44.70
	(0.93,2.60)	(52.33,58.88)	(33.14,39.47)	(5.11,8.39)	(45.13,51.73)	(2.25,4.52)	(45.10,51.68)	(41.44, 48.00)
55-64	0.79	59.10	35.17	4.94	44.79	5.19	50.02	39.30
	(0.39,1.60)	(55.67,62.44)	(31.96,38.52)	(3.65,6.66)	(41.38,48.25)	(3.88,6.91)	(46.57,53.47)	(35.99, 42.71)
65-74	2.16	60.45	33.51	3.88	32.13	6.99	60.88	34.30
	(1.26,3.69)	(56.54,64.22)	(29.91,37.33)	(2.66,5.62)	(28.57,35.91)	(5.22,9.30)	(56.97,64.65)	(30.65, 38.14)
75+	3.71	62.83	30.22	3.23	22.06	5.58	72.35	18.74
	(2.53,5.42)	(58.82,66.68)	(26.61,34.10)	(2.01,5.15)	(18.85,25.64)	(3.96,7.82)	(68.54,75.87)	(15.72, 22.19)
Female								
15-24	13.46	70.77	12.55	3.22	0.36	0.00	99.64	0.76
	(11.24,16.03)	(67.48,73.85)	(10.34,15.16)	(2.34,4.43)	(0.11,1.16)		(98.84,99.89)	(0.43,1.35)
25-34	6.46	66.10	22.33	5.11	2.90	0.06	97.04	3.50
	(5.25,7.94)	(63.37,68.72)	(20.06,24.79)	(3.97,6.55)	(2.05,4.08)	(0.01,0.44)	(95.85,97.89)	(2.65,4.62)
35-44	1.81	61.59	29.86	6.74	8.00	0.07	91.93	4.40
	(1.16,2.81)	(58.64,64.45)	(27.18,32.67)	(5.38,8.41)	(6.45,9.88)	(0.01,0.50)	(90.05,93.49)	(3.37,5.73)

ce (%, 95%CI) Table 2: Distributio f porticipanta h stratified by body in de d alaahalia drinking in Jilin 1 1... .... 490

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45-54	1.99	54.20	36.38	7.44	10.36	0.52	89.12	3.08
	(1.29,3.04)	(51.27,57.09)	(33.62,39.24)	(6.05,9.11)	(8.69,12.31)	(0.23,1.17)	(87.14,90.83)	(2.23,4.25)
55-64	2.53	48.89	40.24	8.34	16.81	1.46	81.73	2.53
	(1.72,3.71)	(45.72,52.08)	(37.17,43.39)	(6.72,10.30)	(14.58,19.30)	(0.85,2.49)	(79.16,84.05)	(1.68,3.81)
65-74	4.89	50.05	38.50	6.57	17.61	1.68	80.71	1.81
	(3.53,6.72)	(46.31,53.78)	(34.91,42.22)	(4.94,8.67)	(14.97,20.60)	(0.93,2.99)	(77.62,83.47)	(1.03,3.16)
75+	10.17	57.46	26.17	6.20	12.82	1.27	85.91	2.48
_	(7.87,13.04)	(53.37,61.45)	(22.77,29.89)	(4.50,8.50)	(10.29,15.87)	(0.64,2.50)	(82.77,88.55)	(1.45,4.23)

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2								
3 4	491	Table 3	Preva	alence of hypertension	on by ag	ge and sex in Jilin pr	ovince	
5		Age		Male		Female		Total
6	-	group	n	CR(95%CI)	n	CR(95%CI)	n	CR(95%CI)
7 8		15-24	80	6.86(5.27,8.87)	23	1.88(1.19,2.96)	103	4.45(3.53,5.59)
9		25-34	106	8.47(6.89,10.36)	50	4.28(3.20,5.69)	156	6.42(5.43,7.58)
10		35-44	221	21.00(18.36,23.91)	195	15.21(13.14,17.55)	416	18.17(16.45,20.03)
11		45-54	379	35.13(32.06,38.33)	430	32.57(29.89,35.36)	809	33.87(31.82,35.99)
12 13		55-64	449	46.42(43.00,49.87)	576	50.72(47.54,53.90)	1025	48.59(46.25,50.94)
14		65-74	451	59.91(55.98,63.71)	518	65.32(61.72,68.76)	969	62.71(60.06,65.29)
15		75+	405	61.24(57.24,65.10)	449	62.37(58.30,66.28)	854	61.86(59.00,64.63)
16	_	Total	2091	25.60(24.41,26.79)	2241	23.84(22.80,24.89)	4332	24.73(23.94,25.53)
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		B	MI			Smoking		Alcohol	Drinking
	<18.5	18.5-25.0	25.0-30.0	>30.0	Current	Ever	Never	Yes	No
Male									
15-24	1.48	4.39	16.22	30.17	8.17	13.13	6.73	11.60	6.56
	(0.37,5.76)	(2.94,6.51)	(10.62,24.00)	(16.58,48.44)	(3.45,18.15)	(1.35,62.57)	(5.10,8.84)	(5.85,21.69)	(4.95, 8.66)
25-34	1.45	5.33	9.15	30.70	11.49	6.89	6.51	10.64	7.55
	(0.20,9.72)	(3.78,7.46)	(6.43,12.85)	(21.42,41.86)	(8.66,15.08)	(0.88,38.13)	(4.80,8.78)	(7.63, 14.64)	(5.80, 9.77)
35-44	5.49	14.76	25.87	45.98	23.76	36.23	18.11	28.02	16.34
	(0.97,25.57)	(11.77,18.34)	(21.16,31.22)	(34.53,57.87)	(19.72,28.33)	(16.51,62.01)	(14.77,22.00)	(23.40, 33.16)	(13.35,19.84
45-54	27.39	25.02	44.90	68.73	37.10	41.53	32.74	43.01	28.76
	(10.96,53.63)	(21.38,29.05)	(39.57,50.35)	(55.83,79.27)	(32.60,41.83)	(25.83,59.16)	(28.51,37.27)	(38.20, 47.96)	(24.95, 32.9)
55-64	11.46	39.64	55.87	65.91	47.15	61.46	44.21	52.10	42.74
	(2.44,40.14)	(35.33,44.11)	(50.07,79.30)	(50.62,78.48)	(42.04,52.33)	(46.39,74.61)	(39.43,49.09)	(46.61, 57.54)	(38.42, 47.18
65-74	19.58	52.27	73.86	80.86	60.60	74.69	57.84	66.86	56.58
	(6.35,46.63)	(47.16,57.34)	(67.56,15.96)	(61.30,91.85)	(53.60,67.20)	(59.79,85.42)	(52.78,62.74)	(60.21, 72.89)	(51.40, 61.04
75+	37.87	58.85	66.71	83.47	68.66	59.10	59.15	65.17	60.34
	(21.57,57.45)	(53.77,63.76)	(59.34,73.34)	(57.75,94.91)	(60.13,76.08)	(41.42,74.69)	(54.42,63.71)	(55.63, 73.63)	(55.90, 64.62
Female									
15-24	1.50	0.91	5.62	10.02	0.00	0.00	1.88	0.00	1.89
	(0.37,5.81)	(0.42,1.98)	(2.53,12.01)	(3.85,23.67)			(1.19,2.97)		(1.19,2.98)
25-34	0.00	2.16	6.56	27.09	12.35	0.00	4.04	0.66	4.41
		(1.29,3.59)	(4.03,10.51)	(16.97,40.31)	(4.36,30.33)		(2.98,5.44)	(0.09,4.63)	(3.29,5.87)
35-44	17.78	9.70	22.05	34.59	19.76	100.00	14.75	25.47	14.74
	(5.86,42.90)	(7.67,12.20)	(17.69,27.14)	(24.35,46.49)	(12.41,29.97)	(100.00,100.00)	(12.62,17.17)	(14.99,39.84)	(12.65,17.11

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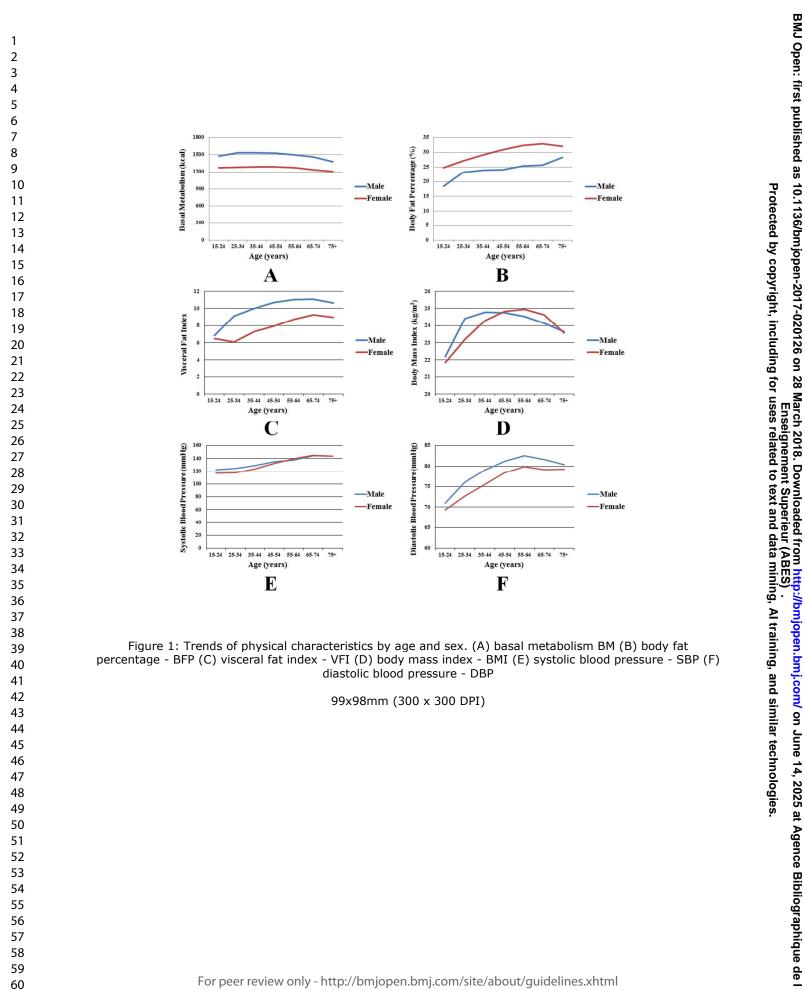
# 495 **Table.5** Risk factors associated with the prevalence of hypertension

	Hypertensio	n prevalence
	Unadjusted	Adjusted
Age(Ref: 15-24)		
25-34	1.47(1.09,1.99)	1.05(0.71,1.55)
35-44	4.77(3.65,6.24)	2.83(1.90,4.22)
45-54	11.01(8.51,14.24)	6.93(4.69,10.24)
55-64	20.31(15.69,26.29)	13.43(9.06,19.90
65-74	36.14(27.73,47.11)	26.18(17.56,39.0
75+	34.85(26.65,45.57)	29.89(19.83,45.0
Sex(Ref: female)	1.1(1.01,1.2)	1.25(1.13,1.39)
Region(Ref: Urban)	1.19(1.09,1.3)	1.25(1.12,1.39)
Race(Ref: Han)	1.15(0.93,1.42)	0.93(0.74,1.18)
Employment(Ref: be employed)		
Retired	2.67(2.22,3.2)	0.67(0.53,0.85)
Student	0.15(0.11,0.21)	1.09(0.71,1.70)
Unemployed	1.18(1.07,1.3)	0.84(0.74,0.95)
Marital(Ref: married)	0.72(0.63,0.83)	1.29(1.00,1.65)
Education level(Ref: college or higher)		
Illiterate	6.69(5.19,8.63)	2.18(1.62,2.93)
Primary	3.26(2.7,3.93)	1.98(1.60,2.44)
Middle	1.55(1.24,1.94)	1.24(0.97,1.57)
BMI(Ref: Normal)		
Overweight	2.22(2.01,2.46)	2.30(2.06,2.57)
Obese	3.96(3.31,4.75)	5.17(4.20,6.37)
AWC(Ref:<90M,<85F)		
≥90M, ≥85F	1.41(1.23,1.62)	1.35(1.16,1.57)
≥95M, ≥90F	1.5(1.32,1.72)	1.68(1.43,1.96)
Family history of hypertension	1.74(1.55,1.96)	2.35(2.06,2.67)
Family history of stroke	1.33(0.85,2.06)	1.79(1.09,2.92)
Family history of CAD	3.18(2.64,3.83)	1.65(1.33,2.03)
Smoker(Ref: no)	1.37(1.23,1.53)	1.23(1.08,1.40)
Drinker(Ref: no)	1.56(1.38,1.77)	1.47(1.27,1.71)
VAI (Ref:<10)	· · · ·	
10~14	1.6(1.41,1.8)	1.40(1.22,1.60)
15~30	2.69(2.29,3.16)	2.05(1.69,2.49)
BFP(Ref:<10M, <20F)		
10~19M, 20~29F	1.31(1,1.71)	0.95(0.71,1.27)
20~24M, 30~34F	2.72(2.09,3.55)	1.24(0.92,1.66)
	3.48(2.67,4.54)	1.45(1.07,1.96)

498 Adjusted for sex, region, age, education level, employment status, marital status, BMI, and family

499 history of hypertension

CAD:



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**Supplementary Table** Descriptions of basal metabolism – BM, body fat percentage – BFP, visceral fat index - VFI by age and sex in Jilin province

	Age		Male		Female
	Age	Mean	95%CI	Mean	95%CI
BM	Total	1511.50	(1504.56,	1280.52	(1276.09, 1284.9
			1518.43)		
	15-24	1478.92	(1456.95,	1279.31	(1264.09, 1294.5
			1500.88)		
	25-34	1538.93	(1524.04,	1281.66	(1272.68,1290.64
			1553.81)		
	35-44	1534.48	(1519.02,	1293.35	(1284.03, 1302.67
			1549.95)		
	45-54	1528.84	(1514.65,	1293.81	(1284.74, 1302.87
			1543.02)		
	55-64	1499.65	(1486.40,	1274.36	(1264.67, 1284.00
			1512.90)		
	65-74	1460.36	(1443.82,	1241.86	(1230.00, 1253.73
			1476.89)		
	75+	1382.81	(1367.17,	1209.84	(1195.08, 1224.59
			1398.45)		
Body Fat	Total	23.28	(23.03, 23.53)	29.19	(29.02, 29.35)
percentage					
	15-24	18.46	(17.52, 19.40)	24.78	(24.38, 25.18)
	25-34	23.26	(22.87, 23.65)	27.20	(26.88,27.52)
	35-44	24.02	(23.64, 24.40)	29.19	(28.86, 29.52)
	45-54	24.09	(23.76, 24.41)	30.95	(30.61, 31.29)
	55-64	25.34	(24.58, 26.10)	32.39	(31.99, 32.80)
	65-74	25.74	(25.30, 26.17)	32.97	(32.46, 33.48)
	75+	28.31	(27.06, 29.56)	32.08	(31.15, 33.00)
VAI	Total	9.63	(9.49, 9.77)	7.42	(7.29, 7.55)
	15-24	6.81	(6.54, 7.08)	6.48	(6.05, 6.91)
	25-34	9.13	(8.81, 9.46)	6.07	(5.83, 6.30)
	35-44	10.01	(9.70, 10.32)	7.25	(6.96, 7.54)
	45-54	10.71	(10.39, 11.03)	7.90	(7.68, 8.11)
	55-64	11.06	(10.74, 11.37)	8.71	(8.47, 8.96)
	65-74	11.11	(10.72, 11.49)	9.27	(8.81, 9.73)
	75+	10.64	(10.21, 11.07)	8.95	(8.56, 9.35)
BMI	Total	24.15	(24.05,24.25)	23.88	(23.78,23.97)
	15-24	22.20	(21.93,22.47)	21.86	(21.63,22.10)
	25-34	24.41	(24.18,24.63)	23.20	(22.99,23.42)
	35-44	24.78	(24.55,25.01)	24.29	(24.08,24.51)
	45-54	24.75	(24.54,25.01)	24.82	(24.63,25.02)
	55-64	24.54	(24.33,24.76)	24.96	(24.74,25.18)

	65-74	24.14	(23.88,24.40)	24.63	(24.35,24.92)
	75+	23.63	(23.37,23.89)	23.56	(23.24,23.88)
SBP	Total	130.44	(129.99,130.88)	127.36	(126.90,127.81)
	15-24	122.45	(121.67,123.24)	116.81	(116.13,117.50)
	25-34	124.43	(123.77,125.08)	117.93	(117.28,118.58)
	35-44	128.76	(127.85,129.67)	123.85	(122.95,124.75)
	45-54	134.69	(133.51,135.87)	132.39	(131.28,133.49)
	55-64	137.56	(136.22,138.91)	139.53	(138.17,140.90)
	65-74	143.98	(142.25,145.71)	145.16	(143.55,146.76)
	75+	143.69	(141.96,145.42)	143.44	(141.60,145.28)
DBP	Total	78.14	(77.84,78.43)	75.45	(75.19,75.71)
	15-24	70.98	(70.43,71.53)	69.35	(68.82,69.88)
	25-34	76.13	(75.63,76.63)	72.69	(72.25,73.13)
	35-44	79.04	(78.42,79.66)	75.47	(74.91,76.03)
	45-54	81.24	(80.51,81.96)	78.41	(77.79,79.03)
	55-64	82.50	(81.67,83.33)	79.87	(79.15,80.60)
	65-74	81.56	(80.72,82.40)	79.13	(78.35,79.91)
	75+	80.38	(79.61,81.15)	79.26	(78.41,80.11)

CI: confidence interval

30.38 (79.61,81.15) 79.26 (78.41,80.11)

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## STROBE Statement-checklist of items that should be included in reports of observational studies

	Item No	Recommendation	
Title and abstract	1	( <i>a</i> ) Indicate the study's design with a commonly used term in the title or t	he abstrac P1-
		(b) Provide in the abstract an informative and balanced summary of what w	as done
		and what was found	P2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being	ng reporte
			F
Objectives	3	State specific objectives, including any prespecified hypotheses	P4
Methods		,	
Study design	4	Present key elements of study design early in the paper	P4-5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recipient	uitment,
		exposure, follow-up, and data collection	P4-5
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and method	s of
		selection of participants. Describe methods of follow-up	
		Case-control study-Give the eligibility criteria, and the sources and method	ods of
		case ascertainment and control selection. Give the rationale for the choice	of cases
		and controls	
		Cross-sectional study-Give the eligibility criteria, and the sources and me	thods of
		selection of participants	P4
		(b) Cohort study-For matched studies, give matching criteria and number	of
		exposed and unexposed	
		Case-control study-For matched studies, give matching criteria and the n	umber of
		controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, a	nd effec
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, a modifiers. Give diagnostic criteria, if applicable	
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Participants	13*	(a) Report numbers of individuals at each stage of study-eg numbers potentially elig	gible,
		examined for eligibility, confirmed eligible, included in the study, completing follow	
		analysed	P7
		(b) Give reasons for non-participation at each stage	P7
		(c) Consider use of a flow diagram	N/A
Descriptive	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and in	
data		on exposures and potential confounders	P7
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Cohort study-Report numbers of outcome events or summary measures over time	
		Case-control study-Report numbers in each exposure category, or summary measur	es of
		exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	P7
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and t	heir
		precision (eg, 95% confidence interval). Make clear which confounders were adjuste	d for and
		precision (eg, 95% confidence interval). Make clear which comounders were adjuste	u ioi allu
		why they were included	P8
		why they were included	P8 P6
		why they were included         (b) Report category boundaries when continuous variables were categorized	P8 P6
Other analyses	17	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a material structure risk into absolute risk fo	P8 P6 heaningful N/A
Other analyses	17	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period	P8 P6 heaningful N/A
Other analyses Discussion	17	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivity	P8 P6 heaningful N/A ty
	17	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivity	P8 P6 heaningful N/A ty
Discussion		why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses	P8 P6 heaningful N/A ty P8-9 P10
<b>Discussion</b> Key results	18	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses         Summarise key results with reference to study objectives	P8 P6 heaningful N/A ty P8-9 P10
<b>Discussion</b> Key results	18	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses         Summarise key results with reference to study objectives         Discuss limitations of the study, taking into account sources of potential bias or impr         Discuss both direction and magnitude of any potential bias	P8 P6 heaningful N/A ty P8-9 P10 ecision. P15
Discussion Key results Limitations	18 19	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses         Summarise key results with reference to study objectives         Discuss limitations of the study, taking into account sources of potential bias or impression	P8 P6 heaningful N/A ty P8-9 P10 ecision. P15
Discussion Key results Limitations Interpretation	18 19	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses         Summarise key results with reference to study objectives         Discuss limitations of the study, taking into account sources of potential bias or impr         Discuss both direction and magnitude of any potential bias         Give a cautious overall interpretation of results considering objectives, limitations, m of analyses, results from similar studies, and other relevant evidence	P8 P6 heaningful N/A ty P8-9 P10 ecision. P15 nultiplicity P10-14
Discussion Key results Limitations Interpretation Generalisability	18           19           20           21	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses         Summarise key results with reference to study objectives         Discuss limitations of the study, taking into account sources of potential bias or impr         Discuss both direction and magnitude of any potential bias         Give a cautious overall interpretation of results considering objectives, limitations, m	P8 P6 heaningful N/A ty P8-9 P10 ecision. P15 nultiplicity P10-14
Discussion Key results Limitations Interpretation	18           19           20           21	why they were included         (b) Report category boundaries when continuous variables were categorized         (c) If relevant, consider translating estimates of relative risk into absolute risk for a m time period         Report other analyses done—eg analyses of subgroups and interactions, and sensitivi analyses         Summarise key results with reference to study objectives         Discuss limitations of the study, taking into account sources of potential bias or impr         Discuss both direction and magnitude of any potential bias         Give a cautious overall interpretation of results considering objectives, limitations, m of analyses, results from similar studies, and other relevant evidence	P8 P6 heaningful N/A ty P8-9 P10 ecision. P15 nultiplicity P10-14 P15

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\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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