

# Trends of Hyperuricemia Prevalence among the Urban and Rural Chinese Populations of the Southeast Coastal Region During the Years 2014-2018: A Retrospective Study

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## Research Article

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1 **Trends of hyperuricemia prevalence among the urban and rural**  
2 **Chinese populations of the southeast coastal region during the years**  
3 **2014–2018: A retrospective study**

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45 **Abstract**

46 **Background:** Hyperuricemia (HUA) is a tremendous health problem  
47 worldwide. Data on the trends of HUA prevalence in China is limited.  
48 Therefore, we assessed this trend among the urban and rural Chinese  
49 populations of the southeast coastal region during 2014–2018.

50 **Methods:** This hospital-based retrospective study lasted 5 years. Data on  
51 physical measures and fasting blood parameters from 210,825 health  
52 checkup subjects from urban and rural tertiary hospitals during  
53 2014–2018 were extracted to investigate the trends of serum uric acid  
54 (SUA) levels and HUA prevalence and to compare them between urban  
55 and rural areas, stratified by year, age, and sex.

56 **Results:** Both SUA ( $395.49 \pm 102.29 \mu\text{mol/L}$ ) levels and HUA prevalence  
57 (37.87%) were high in this population. Mean SUA levels among urban  
58 subjects increased from  $382.54 \pm 91.17 \mu\text{mol/L}$  in 2014 to  $407.38 \pm 103.97$   
59  $\mu\text{mol/L}$  in 2018, and from  $367.75 \pm 90.76 \mu\text{mol/L}$  to  $398.42 \pm 104.6 \mu\text{mol/L}$   
60 in rural subjects. Similarly, urban HUA prevalence increased from  
61 32.87% to 42.41%, and rural from 27.81% to 38.81%. Both SUA levels  
62 and HUA prevalence were higher in urban than in rural areas  
63 ( $397.59 \pm 103.01 \mu\text{mol/L}$  vs  $388.03 \pm 99.34 \mu\text{mol/L}$  and 38.70% vs 34.89%,

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64 respectively,  $P<0.01$ ) and higher in men than women ( $437.87\pm 93.98$   
65  $\mu\text{mol/L}$  vs  $338.21\pm 83.43$   $\mu\text{mol/L}$  and  $54.78\%$  vs  $15.00\%$ , respectively,  
66  $P<0.01$ ). Both SUA levels ( $P<0.01$ ) and HUA prevalence ( $P<0.01$ )  
67 increased with advancing age in urban areas, while seemingly decreasing  
68 and remaining stable after the age of 50 years in rural areas. Although  
69 both SUA levels ( $P<0.001$ ) and HUA prevalence ( $P<0.001$ ) showed a  
70 downward trend in men and an upward trend in women after age 40 in  
71 both areas, men had greater disease burden than women.

72 **Conclusions:** This is the first investigation of SUA levels and HUA  
73 prevalence trends among the urban and rural Chinese population of the  
74 southeast coastal region. Increases in both SUA levels and HUA  
75 prevalence were observed in both areas during 2014–2018. Although  
76 there was a downward trend in men and an upward trend in women of the  
77 SUA levels and the HUA prevalence, men had higher disease burden.  
78 Attention should be paid and effective measures should be taken to lower  
79 the HUA prevalence for men in this population.

80

81 **Keywords:** Serum uric acid, Hyperuricemia, Prevalence, Trends

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86 **Background**

87 Serum uric acid (SUA) is the end product of purine metabolism.  
88 Hyperuricemia (HUA) is a condition characterized by abnormally  
89 elevated SUA levels that results from excessive SUA production and/or  
90 decreased SUA excretion. Elevated SUA concentration leads to gout and  
91 impairs patients' quality of life and wellbeing. Moreover, accumulating  
92 evidence has demonstrated that HUA is associated with hypertension<sup>1</sup>,  
93 cardiovascular disease<sup>2,3</sup>, stroke<sup>4</sup>, diabetes<sup>5,6</sup>, and metabolic syndrome<sup>7</sup>.  
94 Epidemiological investigations found an increasing trend of HUA  
95 prevalence in Western countries<sup>8-10</sup>. However, there was a decreasing  
96 trend observed in Japan and Taiwan<sup>11,12</sup>. Studies investigating the trends  
97 of HUA prevalence among the Chinese population of the southeast  
98 coastal region remain scarce. Hence, the present study aimed to assess the  
99 trends of SUA levels and the prevalence of HUA in this population.

100

101 **Methods**

102 **Data source**

103 Data were extracted from the health care centers of the First Affiliated  
104 Hospital of Shantou University Medical College, which is located in the  
105 urban area of Shantou City, Guangdong Province, China, and Shantou  
106 Chaonan Minsheng Hospital, which is located in the rural area of Shantou  
107 City.

108 **Study population**

109 Subjects who participated in routine checkups in 2014–2018 and had  
110 complete body measurements and laboratory parameters were  
111 investigated in our study. Subjects with missing data for age, gender,  
112 height, body weight and SUA levels were excluded. The study protocol  
113 was approved by the Research Ethics Committees of the First Affiliated  
114 Hospital of Shantou University Medical College and Shantou Chaonan  
115 Minsheng Hospital. Written informed consent was obtained from all  
116 subjects or from a parent in subjects under 18 before data extraction. All  
117 procedures were performed in accordance with Chinese guideline  
118 *Measures for the Ethical Review of Biomedical Research Involving*  
119 *Human Beings* on the use of medical data for research.

120 **Data extraction**

121 Two reviewers extracted the information on age, gender, height, body  
122 weight, and SUA levels from the subjects. Any disagreement on data  
123 extraction between the two reviewers was mediated by discussion.

124 **Definition**

125 HUA was defined as an SUA concentration of more than 420  $\mu\text{mol/L}$  (7  
126  $\text{mg/dL}$ )<sup>13</sup>.

127 **Statistical analyses**

128 SPSS 22.0 was used for data processing and statistical analyses. Data  
129 were entered twice by two different reviewers. The distribution of SUA

130 concentrations was expressed as means  $\pm$  standard deviations. SUA levels  
 131 and prevalence rates of HUA were calculated overall, and were also  
 132 stratified by calendar year, gender, as well as the following age groups:  
 133 <30, 30–39, 40–49, 50–59, 60–69 and  $\geq$ 70. Student’s *t* and chi-square  
 134 tests were used to compare SUA levels and HUA prevalence, respectively,  
 135 between the urban and rural areas. A *P*-value <0.05 was considered  
 136 statistically significant.

137 **Results**

138 A total of 210,825 subjects were enrolled in the study, including 121,192  
 139 (57.48%) men and 89,633 (42.52%) women. The urban versus rural  
 140 participants were 164,679 (78.11%) (91,516 men and 73,163 women) and  
 141 46,146 (21.89%) (29,676 men and 16,470 women), respectively.

142 **SUA levels and prevalence of HUA by sex and area**

143 The overall SUA levels and prevalence of HUA and their stratification by  
 144 sex and area are described in Table 1. Men and subjects from urban areas  
 145 had higher levels of SUA and HUA prevalence than women and subjects  
 146 from rural areas, respectively (*P*<0.01).

147 **Table 1 Mean SUA level and HUA prevalence in 2014-2018**

	<b>Total</b>	<b>Male</b>	<b>Female</b>	<b>Urban</b>	<b>Rural</b>
Mean SUA level	395.49 $\pm$ 102.29	437.87 $\pm$ 93.98	338.21 $\pm$ 83.43 <sup>a*</sup>	397.59 $\pm$ 103.01	388.03 $\pm$ 99.34 <sup>b*</sup>
M $\pm$ SD ( $\mu$ mol/L)					
HUA prevalence	37.87	54.78	15.00 <sup>a*</sup>	38.70	34.89 <sup>b*</sup>

148 a\*:compared with male,  $P<0.01$ .

149 b\*:compared with urban,  $P<0.01$ .

150 M mean and SD standard deviation.

151 During the observation period, there was an increase in the SUA levels  
152 from  $382.54\pm 91.17\mu\text{mol/L}$  in 2014 to  $407.38\pm 103.97\mu\text{mol/L}$  in 2018 in  
153 urban areas and from  $367.75\pm 90.76\mu\text{mol/L}$  to  $398.42\pm 104.61\mu\text{mol/L}$  in  
154 rural areas (Figure 1). There was also an increase in the prevalence of  
155 HUA from 32.87% to 42.41% in urban areas and from 27.81% to 38.81%  
156 in rural areas during the same period (trend for  $P<0.01$ ) (Figure 2).

#### 157 **Trends in SUA levels and prevalence of hyperuricemia by age**

158 The overall SUA level ( $P<0.01$ ) and HUA prevalence ( $P<0.01$ ) increased  
159 with age in urban areas, with the highest level ( $410.75\pm 99.87\mu\text{mol/L}$ )  
160 and highest prevalence (43.04%) among subjects aged 70 years or older  
161 (Figure 3). However, the overall SUA level and HUA prevalence peaked  
162 in the 30–39 age group and appeared to decrease and remain stable after  
163 the age of 50 years in rural areas (Figure 4 ).

#### 164 **Trends in SUA levels and prevalence of hyperuricemia by gender**

165 During the 5-year period, both the SUA levels and HUA prevalence  
166 stayed relatively stable under the age of 40 years for both sexes in urban  
167 and rural areas. After the age of 40 years, SUA levels and HUA  
168 prevalence appeared to decrease for men in both areas (Figure 5). Women,

169 however, continued to show an upward trend with age (trend for  $P<0.001$ )  
170 (Figure 6).

171

## 172 **Discussion**

173 The current study showed that the mean SUA levels and HUA prevalence  
174 were  $395.49\pm 102.2$   $\mu\text{mol/L}$  and 37.87%, respectively. A recent  
175 meta-analysis evaluated the HUA prevalence in the general Chinese  
176 population from 2000 to 2014 and reported that the HUA prevalence was  
177 13.3%<sup>14</sup>. The HUA prevalence in the population of the southeast coastal  
178 region of China in the present study was remarkably higher than in the  
179 general Chinese population. Xie *et al*<sup>15</sup> investigated the HUA prevalence  
180 in the Chinese population of the southeast coastal region in 2011 and  
181 showed that the HUA prevalence was 37.1%. Compared with 2011, the  
182 HUA prevalence showed a tendency to increase among this population in  
183 2014–2018. Furthermore, substantial increasing trends in both SUA levels  
184 and HUA prevalence were observed in both urban and rural Chinese  
185 populations of the southeast coastal region in 2014–2018 and may still be  
186 increasing. Our findings are consistent with previous investigations that  
187 observed an increasing trend of HUA prevalence over time<sup>8-10,16</sup>. It has  
188 been reported that the Chinese population of the southeast coastal region  
189 have a diet rich in seafood<sup>15,17</sup>. A previous study revealed that  
190 consumption of seafood was highly correlated with HUA prevalence<sup>18</sup>. In

191 addition, genetic variation may partly explain the high prevalence of  
192 HUA among this population. Yang *et al*<sup>19</sup> reported that a high incidence  
193 rate of HUA was significantly associated with variants in  
194 ABCG2rs2231142 in the Chinese population of the southeast coastal  
195 region. Our study also demonstrated that both SUA levels and HUA  
196 prevalence were higher in urban areas than in rural areas and in men than  
197 in women, which were in line with the previous study as reported by Liu  
198 *et al*<sup>14</sup>. Aging is an important risk factor of HUA. Our findings revealed  
199 that both SUA levels and HUA prevalence increased with age in the urban  
200 area. However, they appeared to decrease and stay stable after the age of  
201 50 years in the rural area.

202 In both sexes, SUA levels and HUA prevalence were relatively  
203 stable under age 40 in both urban and rural areas. However, after this age,  
204 men appeared to show a downward trend while women show an upward  
205 trend. Despite the different trends of both SUA levels and HUA  
206 prevalence between men and women, it is evident over a 5-year period  
207 that men still bear most of the disease burden. In ages younger than 40  
208 years, The prevalence of HUA in men was 6–8 times more than that in  
209 women (6–8:1 ratio) in both urban and rural areas. In ages older than 60  
210 years, the gender ratio narrowed to 1.5–2:1.

211 To the best of our knowledge, this is the first epidemiological  
212 investigation of trends of SUA levels and HUA prevalence in the

213 southeast China population among those who received health checkups.  
214 The strength of our study is that it uses 5 consecutive years of study data  
215 with a large sample size, which is more valuable than the cross-sectional  
216 study results. Some limitations of our study should be mentioned. First,  
217 our study is a retrospective study and thus the results cannot be  
218 generalized to the entire population of southeast China. Second, we  
219 cannot analyze the prevalence of gout and the effect of dietary habits and  
220 lifestyle on SUA levels and HUA prevalence due to the retrospective data.  
221 Finally, the effect of drugs on SUA levels and HUA prevalence cannot be  
222 analyzed because the possibility that subjects with normal SUA levels  
223 may be receiving urate-lowering therapy cannot be ruled out.

224

## 225 **Conclusion**

226 The current study showed that the SUA levels and the prevalence of HUA  
227 substantially increased among urban and rural Chinese populations of the  
228 southeast coastal region in 2014–2018. Although there is a downward  
229 trend in men and an upward trend in women in the SUA levels and the  
230 prevalence of HUA over the 5-year period, men still had the greater  
231 disease burden. Special attention should be paid, and effective measures  
232 should be taken to lower the HUA prevalence for men in this population.

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234

235 **Declarations**

236 **Ethics approval**

237 The protocol was approved by the Research Ethics Committee of the First  
238 Affiliated Hospital of Shantou University Medical College and Shantou  
239 Chaonan Minsheng Hospital. Written informed consent was obtained  
240 from each subject or from a parent in subjects under 18 before data  
241 extraction.

242 **Consent for publication**

243 Not applicable.

244 **Availability of data and materials**

245 All data generated or analyzed during this study are included in this  
246 published article.

247 **Competing interests**

248 The authors declare that they have no competing interests.

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256 **Authors' contributions**

257 Dr. Li-ping Li and Dr. Yong-song Chen designed, organized and  
258 supervised the study. Dr. Xu-xin Zhu contributed to running the study,  
259 interpreting the data and draft the first manuscript. Dr. Min-hua Hu  
260 contributed to running the study and interpreting the data. Dr Chun-na  
261 Wu and Dr Pei-xuan Yang participated in data extraction and coordination.  
262 Dr. Li-ping Li had access to all the data in the study and took  
263 responsibility for the integrity of the data and the accuracy of the data  
264 analysis.

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367 **Legends of the figures**

368 **Figure 1:** The SUA levels from 2014 to 2018 were  $382.54 \pm 91.17 \mu\text{mol/L}$ ,  
369  $391.09 \pm 103.80 \mu\text{mol/L}$ ,  $399.92 \pm 102.11 \mu\text{mol/L}$ ,  $405.05 \pm 105.05 \mu\text{mol/L}$   
370 and  $407.38 \pm 103.97 \mu\text{mol/L}$ , respectively in urban areas and  
371  $367.75 \pm 90.76 \mu\text{mol/L}$ ,  $382.40 \pm 94.62 \mu\text{mol/L}$ ,  $376.07 \pm 96.59 \mu\text{mol/L}$ ,  
372  $399.28 \pm 100.41 \mu\text{mol/L}$  and  $398.42 \pm 104.61 \mu\text{mol/L}$ , respectively in  
373 rural areas. An increasing trend of SUA levels was observed in both areas  
374 ( $F= 318.211$ ,  $P < 0.01$  in urban areas and  $F=150.584$ ,  $P < 0.01$  in rural  
375 areas).

376 **Figure 2:** The HUA prevalence from 2014 to 2018 was 32.87%, 36.58%,  
377 39.78%, 41.15% and 42.41%, respectively in urban areas and 27.81%,  
378 32.29%, 30.30%, 39.43% and 38.81%, respectively in rural areas. An  
379 increasing trend of HUA prevalence was observed in both areas ( $Z=$   
380  $737.894$ ,  $P < 0.01$  in urban areas and  $Z=279.3$ ,  $P < 0.01$  in rural areas).

381 **Figure 3:** The SUA levels by the age groups of  $< 30$ , 30-39, 40-49,  
382 50-59, 60-69 and  $\geq 70$  were  $389.47 \pm 108.20 \mu\text{mol/L}$ ,  $394.51 \pm 109.62$   
383  $\mu\text{mol/L}$ ,  $394.11 \pm 104.16 \mu\text{mol/L}$ ,  $399.90 \pm 95.01 \mu\text{mol/L}$ ,  $408.21 \pm 96.00$   
384  $\mu\text{mol/L}$  and  $410.75 \pm 99.87 \mu\text{mol/L}$ , respectively in urban areas and  
385  $374.83 \pm 104.15 \mu\text{mol/L}$ ,  $393.34 \pm 105.40 \mu\text{mol/L}$ ,  $392.97 \pm 99.54$   
386  $\mu\text{mol/L}$ ,  $388.15 \pm 91.91 \mu\text{mol/L}$ ,  $388.98 \pm 92.18 \mu\text{mol/L}$  and  $389.23 \pm$   
387  $93.72 \mu\text{mol/L}$ , respectively in rural areas. An increasing trend of SUA  
388 levels with age was observed in urban subjects ( $F=136.622$ ,  $P < 0.01$ ).

389 **Figure 4:** The HUA prevalence by the age groups of <30, 30-39, 40-49,  
390 50-59, 60-69 and  $\geq 70$  was 35.94%, 38.30%, 37.74%, 39.04%, 41.78%  
391 and 43.04%, respectively in urban areas and 29.92%, 38.05%, 37.55%,  
392 34.21%, 33.72% and 34.64%, respectively in rural areas. An increasing  
393 trend of HUA prevalence with age was observed in urban subjects( $Z$   
394  $=247.659$ ,  $P < 0.01$ ).

395 **Figure 5:** The SUA levels by the age groups of < 30, 30-39, 40-49,  
396 50-59, 60-69 and  $\geq 70$  in males were  $449.65 \pm 96.68$   $\mu\text{mol/L}$ ,  $451.39 \pm$   
397  $96.74$   $\mu\text{mol/L}$ ,  $446.97 \pm 92.34$   $\mu\text{mol/L}$ ,  $435.99 \pm 90.05$   $\mu\text{mol/L}$ ,  $430.14 \pm$   
398  $92.95$   $\mu\text{mol/L}$  and  $426.86 \pm 97.75$   $\mu\text{mol/L}$ , respectively in urban areas and  
399  $437.99 \pm 95.08$   $\mu\text{mol/L}$ ,  $434.26 \pm 92.80$   $\mu\text{mol/L}$ ,  $420.60 \pm 88.67$   $\mu\text{mol/L}$ ,  
400  $410.42 \pm 86.47$   $\mu\text{mol/L}$ ,  $404.07 \pm 89.44$   $\mu\text{mol/L}$  and  $404.50 \pm 89.61$   
401  $\mu\text{mol/L}$ , respectively in rural areas. A downward trend of SUA levels after  
402 age 40 was observed in males in both areas ( $F=158.744$ ,  $P < 0.001$  in  
403 urban areas and  $F=106.403$ ,  $P < 0.001$  in rural areas). The SUA levels in  
404 females were  $320.57 \pm 74.28$   $\mu\text{mol/L}$ ,  $320.69 \pm 76.27$   $\mu\text{mol/L}$ ,  $326.08 \pm$   
405  $74.93$   $\mu\text{mol/L}$ ,  $360.78 \pm 84.13$   $\mu\text{mol/L}$ ,  $380.15 \pm 92.46$   $\mu\text{mol/L}$  and  $380.80$   
406  $\pm 96.84$   $\mu\text{mol/L}$ , respectively in urban areas and  $312.11 \pm 68.90$   $\mu\text{mol/L}$ ,  
407  $308.60 \pm 71.38$   $\mu\text{mol/L}$ ,  $314.38 \pm 73.82$   $\mu\text{mol/L}$ ,  $342.92 \pm 81.97$   $\mu\text{mol/L}$ ,  
408  $360.78 \pm 88.10$   $\mu\text{mol/L}$  and  $360.07 \pm 94.57$   $\mu\text{mol/L}$ , respectively in rural  
409 areas. An upward trend of SUA levels after age 40 was observed in  
410 females in both areas ( $F=1274.720$ ,  $P < 0.001$  in urban areas and  $F=$

411 188.114,  $P < 0.001$  in rural areas).

412 **Figure 6:** The HUA prevalence by the age groups of  $<30$ , 30-39, 40-49,  
413 50-59, 60-69 and  $\geq 70$  in males was 59.27%, 60.20%, 59.13%, 54.88%,  
414 51.77% and 49.92%, respectively in urban areas and 53.43%, 53.02%,  
415 49.79%, 42.97%, 39.39% and 40.84%, respectively in rural areas. A  
416 downward trend of HUA prevalence after age 40 was observed in males  
417 in both areas ( $Z=388.510$ ,  $P < 0.001$  in urban areas and  $Z=266.700$ ,  $P <$   
418  $0.001$  in rural areas). The HUA prevalence in females was 9.24%, 9.88%,  
419 10.22%, 21.87%, 29.00% and 30.24%, respectively in urban areas and  
420 6.58%, 6.38%, 8.43%, 15.63%, 22.32% and 22.88%, respectively in rural  
421 areas( $Z= 2826.168$ ,  $P < 0.001$  in urban areas and  $Z= 444.955$ ,  $P < 0.001$   
422 in rural areas).

423

424

## Figures

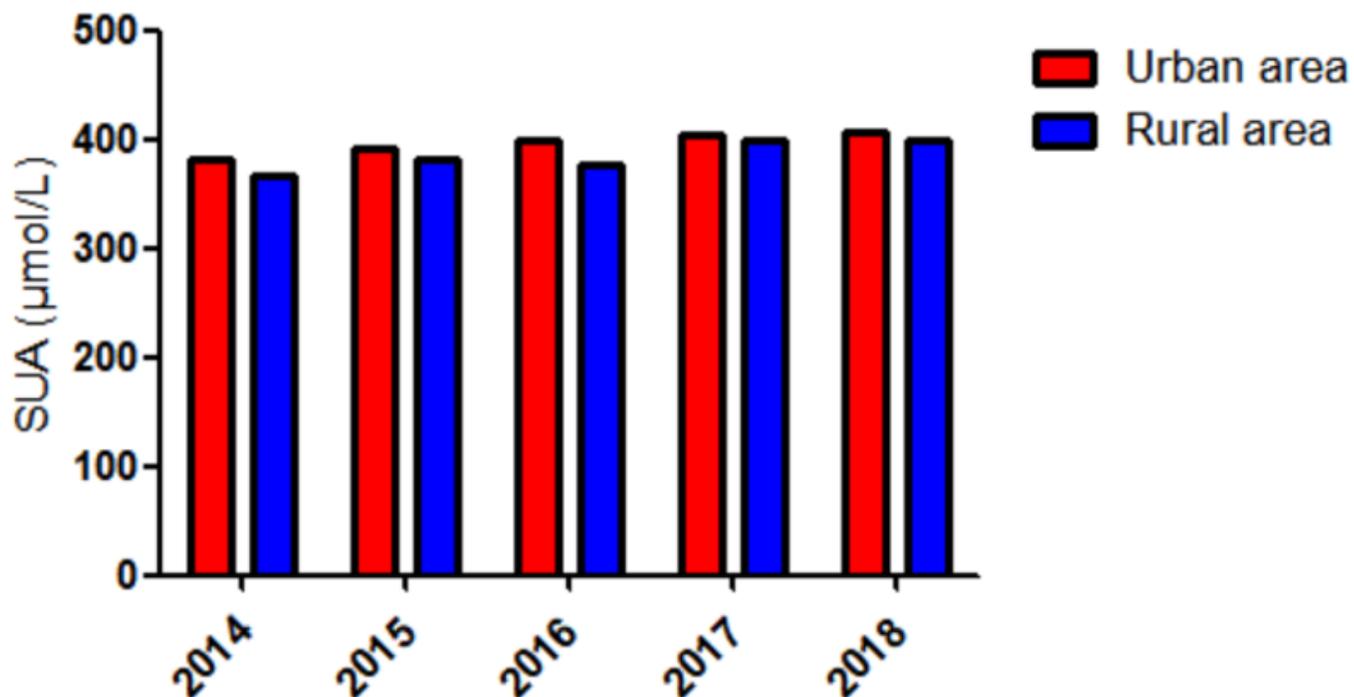


Figure 1

The SUA levels from 2014 to 2018 were  $382.54 \pm 91.17$  µmol/L,  $391.09 \pm 103.80$  µmol/L,  $399.92 \pm 102.11$  µmol/L,  $405.05 \pm 105.05$  µmol/L and  $407.38 \pm 103.97$  µmol/L, respectively in urban areas and  $367.75 \pm 90.76$  µmol/L,  $382.40 \pm 94.62$  µmol/L,  $376.07 \pm 96.59$  µmol/L,  $399.28 \pm 100.41$  µmol/L and  $398.42 \pm 104.61$  µmol/L, respectively in rural areas. An increasing trend of SUA levels was observed in both areas ( $F=318.211$ ,  $P < 0.01$  in urban areas and  $F=150.584$ ,  $P < 0.01$  in rural areas).

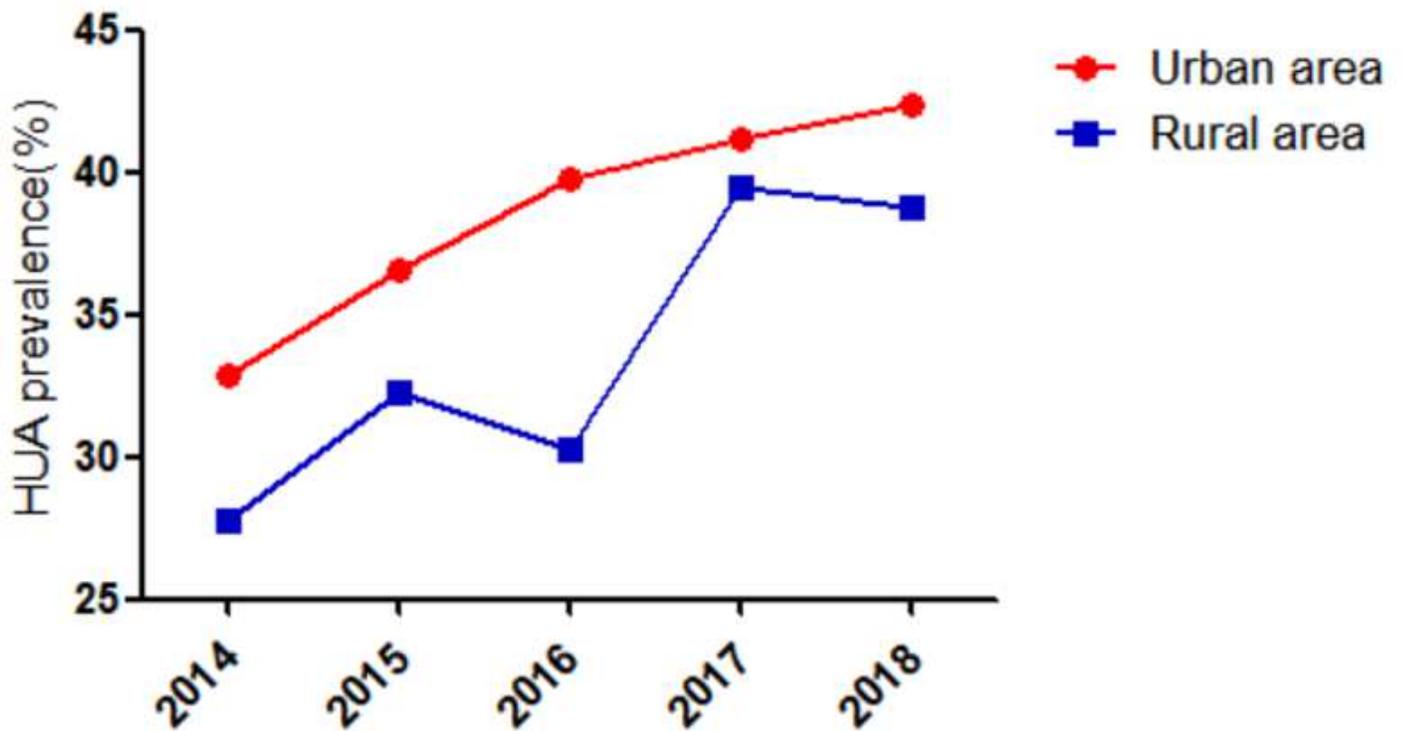
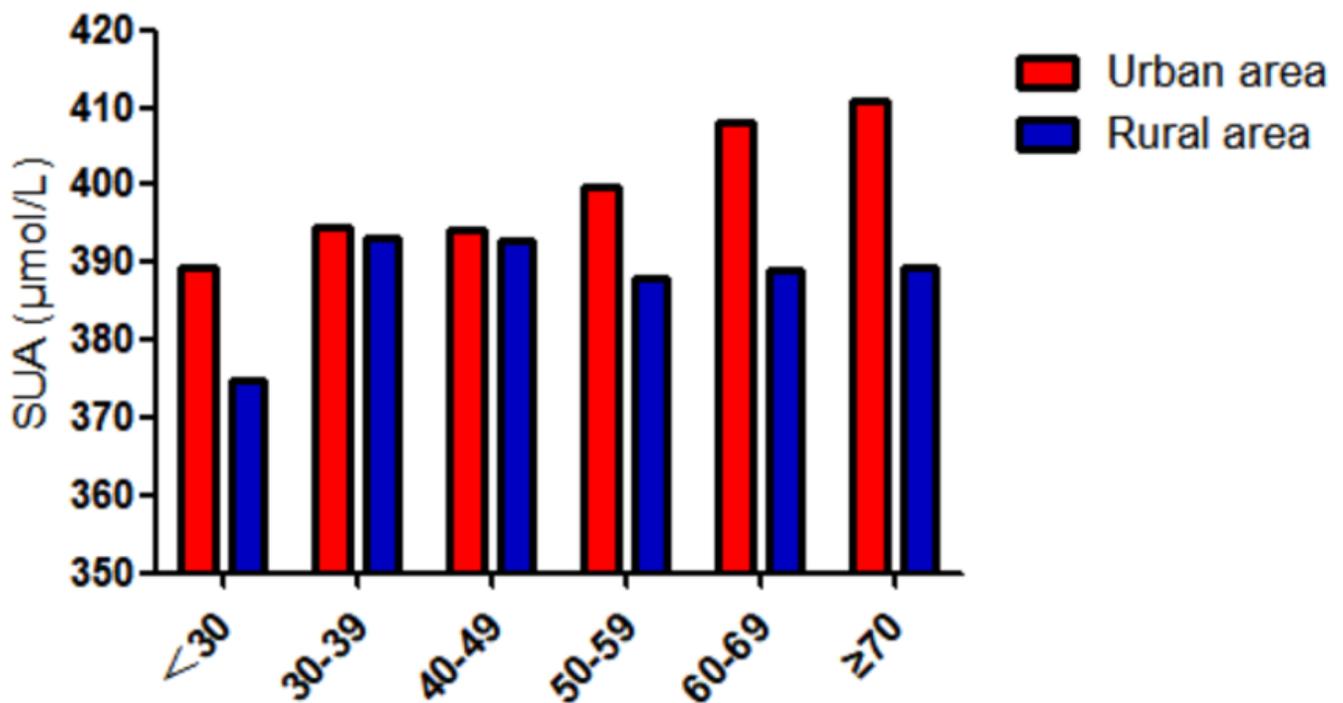


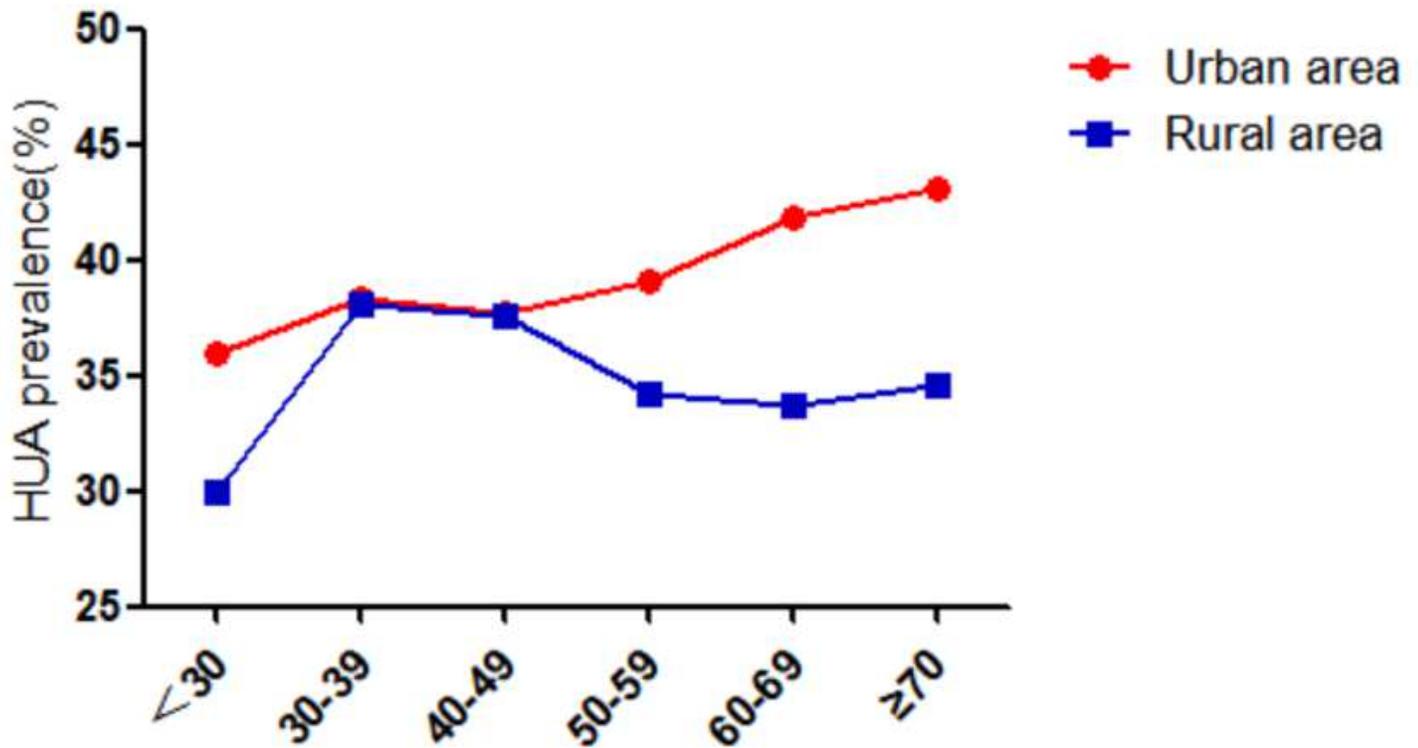
Figure 2

The HUA prevalence from 2014 to 2018 was 32.87%, 36.58%, 39.78%, 41.15% and 42.41%, respectively in urban areas and 27.81%, 32.29%, 30.30%, 39.43% and 38.81%, respectively in rural areas. An increasing trend of HUA prevalence was observed in both areas ( $Z=737.894$ ,  $P<0.01$  in urban areas and  $Z=279.3$ ,  $P<0.01$  in rural areas).



**Figure 3**

The SUA levels by the age groups of  $\leq 30$ , 30-39, 40-49, 50-59, 60-69 and  $\geq 70$  were  $389.47 \pm 108.20 \mu\text{mol/L}$ ,  $394.51 \pm 109.62 \mu\text{mol/L}$ ,  $394.11 \pm 104.16 \mu\text{mol/L}$ ,  $399.90 \pm 95.01 \mu\text{mol/L}$ ,  $408.21 \pm 96.00 \mu\text{mol/L}$  and  $410.75 \pm 99.87 \mu\text{mol/L}$ , respectively in urban areas and  $374.83 \pm 104.15 \mu\text{mol/L}$ ,  $393.34 \pm 105.40 \mu\text{mol/L}$ ,  $392.97 \pm 99.54 \mu\text{mol/L}$ ,  $388.15 \pm 91.91 \mu\text{mol/L}$ ,  $388.98 \pm 92.18 \mu\text{mol/L}$  and  $389.23 \pm 93.72 \mu\text{mol/L}$ , respectively in rural areas. An increasing trend of SUA levels with age was observed in urban subjects ( $F=136.622$ ,  $P \leq 0.01$ ).



**Figure 4**

The HUA prevalence by the age groups of  $\leq 30$ , 30-39, 40-49, 50-59, 60-69 and  $\geq 70$  was 35.94%, 38.30%, 37.74%, 39.04%, 41.78% and 43.04%, respectively in urban areas and 29.92%, 38.05%, 37.55%, 34.21%, 33.72% and 34.64%, respectively in rural areas. An increasing trend of HUA prevalence with age was observed in urban subjects ( $Z = 247.659$ ,  $P \leq 0.01$ ).

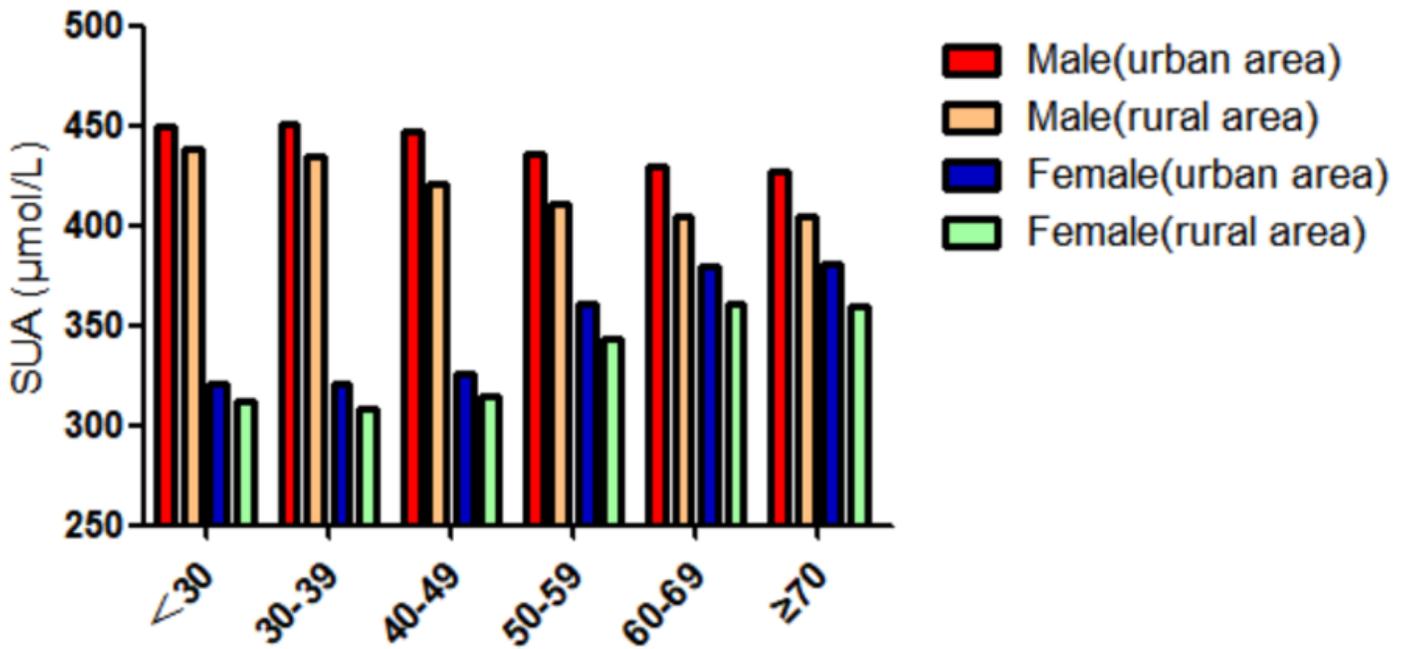


Figure 5

The SUA levels by the age groups of  $\leq 30$ , 30-39, 40-49, 50-59, 60-69 and  $\geq 70$  in males were  $449.65 \pm 96.68$   $\mu\text{mol/L}$ ,  $451.39 \pm 96.74$   $\mu\text{mol/L}$ ,  $446.97 \pm 92.34$   $\mu\text{mol/L}$ ,  $435.99 \pm 90.05$   $\mu\text{mol/L}$ ,  $430.14 \pm 92.95$   $\mu\text{mol/L}$  and  $426.86 \pm 97.75$   $\mu\text{mol/L}$ , respectively in urban areas and  $437.99 \pm 95.08$   $\mu\text{mol/L}$ ,  $434.26 \pm 92.80$   $\mu\text{mol/L}$ ,  $420.60 \pm 88.67$   $\mu\text{mol/L}$ ,  $410.42 \pm 86.47$   $\mu\text{mol/L}$ ,  $404.07 \pm 89.44$   $\mu\text{mol/L}$  and  $404.50 \pm 89.61$   $\mu\text{mol/L}$ , respectively in rural areas. A downward trend of SUA levels after age 40 was observed in males in both areas ( $F=158.744$ ,  $P \leq 0.001$  in urban areas and  $F=106.403$ ,  $P \leq 0.001$  in rural areas). The SUA levels in females were  $320.57 \pm 74.28$   $\mu\text{mol/L}$ ,  $320.69 \pm 76.27$   $\mu\text{mol/L}$ ,  $326.08 \pm 74.93$   $\mu\text{mol/L}$ ,  $360.78 \pm 84.13$   $\mu\text{mol/L}$ ,  $380.15 \pm 92.46$   $\mu\text{mol/L}$  and  $380.80 \pm 96.84$   $\mu\text{mol/L}$ , respectively in urban areas and  $312.11 \pm 68.90$   $\mu\text{mol/L}$ ,  $308.60 \pm 71.38$   $\mu\text{mol/L}$ ,  $314.38 \pm 73.82$   $\mu\text{mol/L}$ ,  $342.92 \pm 81.97$   $\mu\text{mol/L}$ ,  $360.78 \pm 88.10$   $\mu\text{mol/L}$  and  $360.07 \pm 94.57$   $\mu\text{mol/L}$ , respectively in rural areas. An upward trend of SUA levels after age 40 was observed in females in both areas ( $F=1274.720$ ,  $P \leq 0.001$  in urban areas and  $F=188.114$ ,  $P \leq 0.001$  in rural areas).

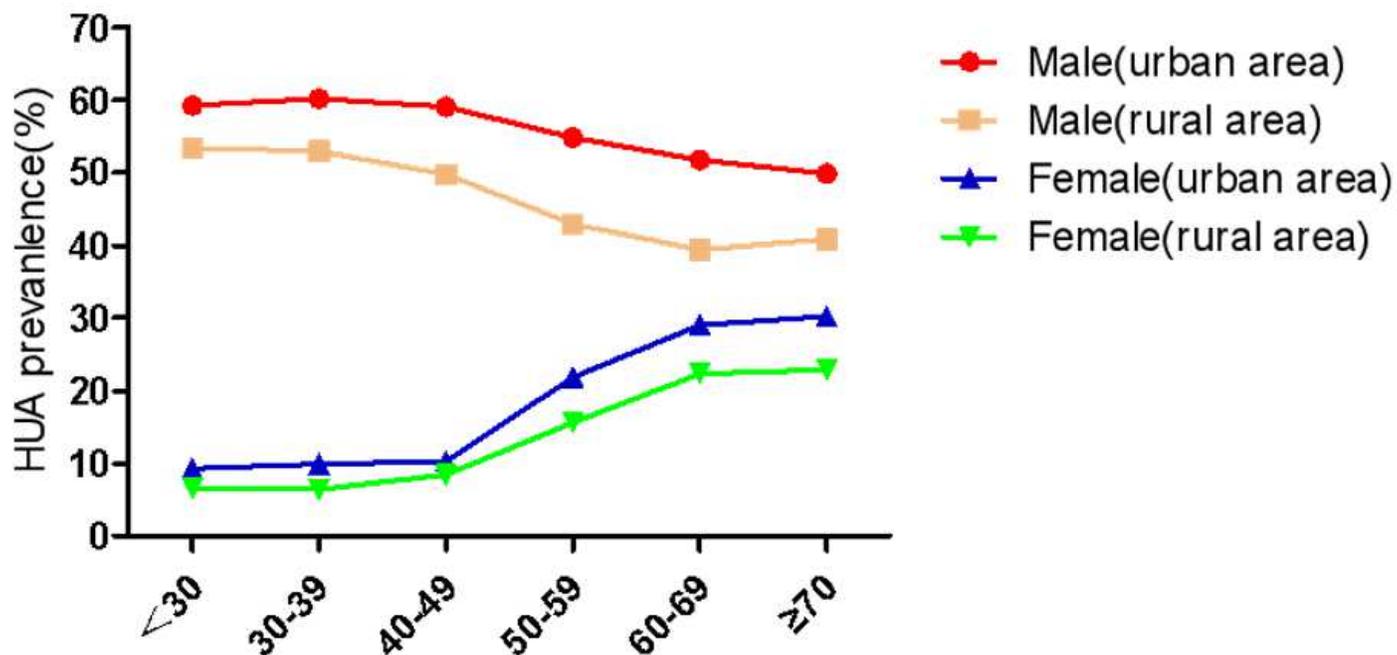


Figure 6

The HUA prevalence by the age groups of ≤30, 30-39, 40-49, 50-59, 60-69 and ≥70 in males was 59.27%, 60.20%, 59.13%, 54.88%, 51.77% and 49.92%, respectively in urban areas and 53.43%, 53.02%, 49.79%, 42.97%, 39.39% and 40.84%, respectively in rural areas. A downward trend of HUA prevalence after age 40 was observed in males in both areas ( $Z=388.510$ ,  $P<0.001$  in urban areas and  $Z=266.700$ ,  $P<0.001$  in rural areas). The HUA prevalence in females was 9.24%, 9.88%, 10.22%, 21.87%, 29.00% and 30.24%, respectively in urban areas and 6.58%, 6.38%, 8.43%, 15.63%, 22.32% and 22.88%, respectively in rural areas ( $Z=2826.168$ ,  $P<0.001$  in urban areas and  $Z=444.955$ ,  $P<0.001$  in rural areas).