

A nationwide report on blood pressure of children and adolescents according to socioeconomic status: The CASPIAN-IV study

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Background: Hypertension is a major leading factor for global burden of diseases. Blood pressure (BP) tracks from childhood to adulthood. So, it is important to investigate its affecting factors. In this study we aimed to compare the BP status in the Iranian pediatric population according to the socioeconomic status (SES) of their living area. **Materials and Methods:** In this nationwide study, a representative sample of 14,880 students, aged 6-18 years was chosen by multistage random cluster sampling from 30 provinces in Iran. Anthropometric indices and BP were measured. A validated questionnaire, including the questions of the World Health Organization Global School-based Student Health Survey was completed. Findings were compared across the four regions of the country, categorized based on their elevating SES: Southeast, north-northeast, west, and central. **Results:** Participants consisted of 13,486 children and adolescents, that is, a participation rate of 90.6%, composed of 49.2% girls and 75.6% urban residents. The mean (standard deviation) age of participants was 12.47 (3.36) years. The region with highest SES (central) had the lowest rate of high BP (HBP), that is, 3.0% (95% of confidence interval [CI]: 2.4-3.9), and the region with lowest SES (southeast) had the highest rate, that is, 7.4% (4.4-12.2). The mean (95% CI) values of systolic BP for the four regions from lowest to highest SES were 100.5 (99.6-101.3), 100.9 (100.3-101.4), 101.7 (101.3-102), and 101.7 (101.2-102.1) mmHg. The corresponding mean Diastolic BP values were as follows: 65.4 (64.6-66.1), 63.4 (62.9-63.8), 65.6 (65.3-65.8), and 64.4 (64.0-64.7) mmHg. **Conclusion:** We found significant differences in mean BP and the frequency of HBP according to the SES of the living area. Further studies are necessary to find the underlying factors resulting in such differences.

Key words: Adolescent, blood pressure, child, high blood pressure, socioeconomic status

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INTRODUCTION

High blood pressure (HBP) is the top global health burden risk factor.^[1] BP tracks from childhood to adulthood. Childhood obesity epidemic and lifestyle changes have resulted in increasing prevalence of HBP in the pediatric population.^[2,3] The strong relationship

of even early stages of HBP with environmental factors as air pollution, noise pollution, and smoking, as well as with obesity suggest that its prevalence will have a persistent rise.^[4]

Beside the effect of fetal programming process (Barker hypothesis)^[5] and aforementioned factors, other factors, including being born small for gestational age or preterm, determine the BP value in childhood,^[6]

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1 which will define adult BP level through the “tracking”
2 phenomenon.^[7-10] Therefore, higher BP values in the
3 pediatric age track into adulthood and would bring their
4 long-term health consequences.
5

6 A number of studies worldwide have proposed the potential
7 influence of living region on BP. For instance, the sixty
8 percent higher prevalence of hypertension (HTN) in Europe
9 compared with the United States and Canada,^[11] high
10 prevalence of HTN in regions like South Asia,^[12] association
11 of BP with different dietary habits in various regions
12 with various sociodemographic circumstances,^[13] and the
13 concordance of low air quality of some regions with cardio-
14 metabolic risk factors such as HTN^[14] are some examples.
15 Socioeconomic status (SES), especially education level
16 has supposed to be affecting on cardiovascular health.^[15]
17 A meta-analysis provided evidence for the association
18 between HTN and SES in rural populations of low- and
19 middle-income countries according to the geographical
20 region.^[16] Another meta-analysis depicted such a relation
21 at the global level.^[17] However, in accordance with now-a-
22 days globesity, youth from all circumstances are susceptible
23 to metabolic risk.^[18]
24

25 Iran is a large country of Middle East with diverse
26 geographic, ethnic, economic and social specifications.^[19]
27

28 Until date, not many studies have focused on evaluating
29 noncommunicable diseases risk factors including BP in the
30 pediatric population of Iran. There is scarce information at
31 national level on BP of children and adolescents and no data
32 exists on the comparison of their BP status across different
33 provinces/regions of the country and its correlation to the
34 social, economic, and ecological factors. In most available
35 studies, those parameters are estimated at individual levels.
36 Such information would help to discover the most vulnerable
37 areas helping policy makers to make proper decisions. This
38 study aims to compare the BP status in the Iranian pediatric
39 population according to the SES of their living area.
40

41 MATERIALS AND METHODS

42 Study design, population, and sampling

43 The Childhood and Adolescence Surveillance and Prevention
44 of Adult Noncommunicable Disease (CASPIAN) study, is a
45 national school based surveillance system inspired by World
46 Health Organization (WHO) recommendations, which
47 started on 2003 and has been conducted in four different
48 surveys until 2012.^[20] Detailed methods of the fourth survey
49 are presented elsewhere.^[21,22] In brief, CASPIAN-IV study
50 was a national cross-sectional survey on 14,880 school
51 students, aged 6-18 years. They were selected via multistage
52 cluster random sampling from rural and urban areas of
53 different cities in 30 provinces of the country. Stratification
54
55

1 was performed based on living areas (urban/rural) and
2 school grade (elementary/intermediate/high school). The
3 sampling was proportional to size with equal sex ratio. The
4 number of samples in rural/urban areas and in each school
5 grade was allocated proportionally to the population of
6 students in each grade. Cluster sampling with equal clusters
7 was used in each province to scope the required sample size
8 (48 clusters of 10 students in each province). The students
9 from other nationalities residing in Iran (such as Afghans)
10 or the students who themselves or their parents did not
11 agree to enter the study were not included. Other students
12 were included regardless of their health status due to the
13 epidemiologic nature of the study.
14

15 Questionnaires

16 Questionnaires were compiled with some modifications
17 on the WHO Global School-based Student Health Survey
18 program.^[20-23] The subjects filled out questionnaires in
19 their schools under the supervision of trained staff and the
20 presence of at least one parent.
21

22 Physical measurements

23 Anthropometric measures included height, weight and
24 hip, waist and wrist circumferences. Then the body mass
25 index (BMI), waist to hip and waist to height ratios were
26 calculated.
27

28 Trained health professionals measured BP according to
29 standard protocol^[24] and by using calibrated instruments.
30 After enough rest, BP readings were taken twice from
31 each person with 5 min interval. The readings at the first
32 Korotkoff sound were considered as the systolic BP (SBP)
33 and at the fifth sound as diastolic BP (DBP). The average of
34 two measurements was recorded.
35

36 According to the fourth report of the working group
37 (formerly task force) on BP control in children, commissioned
38 by the National Heart, Lung, and Blood Institute of the
39 National Institutes of Health of America, BP levels equal
40 or more than the 95th percentile value for the age, sex, and
41 height it was considered as HBP.^[24]
42

43 Quality control

44 In addition to training the data collection team, a detailed
45 operation manual was developed and distributed to the
46 team. A supervisor and a team of external evaluators
47 monitored performance, and checked and calibrated
48 equipment according to standardized protocols. The
49 Context, Input, Process, and Product evaluation model was
50 used to guide the evaluation of the project.^[20]
51

52 Country regions

53 According to a previous national study, the country
54 provinces are grouped into four different regions:
55

Southeast, north-northeast, west and central. The regions are defined based on a combination of geography and SES. SES was measured using an index constructed from variables from the 2006 country census, including years of schooling, employment rates, and family properties. These characteristics were combined using principal component analysis. The principal components in combination with geography were used to divide the country into four large regions. The southeast region had the lowest, the north-northeast region the second low, the west region the second high and the central region the highest SES [Figure 1].^[19]

Ethical considerations

The study was approved by relevant regulatory organizations and institutional review boards. Written informed consent from parents and verbal assent from students were taken after the clear explanation. Data handled confidentially and de-identified. Each subject could withdraw his/her consent at any time.

Statistical analysis

STATA statistical software (Release 12. College Station, TX, USA: StataCorp LP) and survey data analysis methods were used for statistical analysis. Mean and 95% of confidence interval (CI) for quantitative measures and frequencies/prevalence rates with the same CIs were recorded for categorical variables. Analysis of variance and Chi-square tests were used for comparisons of BP across regions. $P < 0.05$ was considered as statistically significant. Plots of mean values of BP and prevalence rate of HBP distribution over the country were drawn using MapTools, SDMTTools and Plotrix packages by R software (version 2.15.1).^[25]

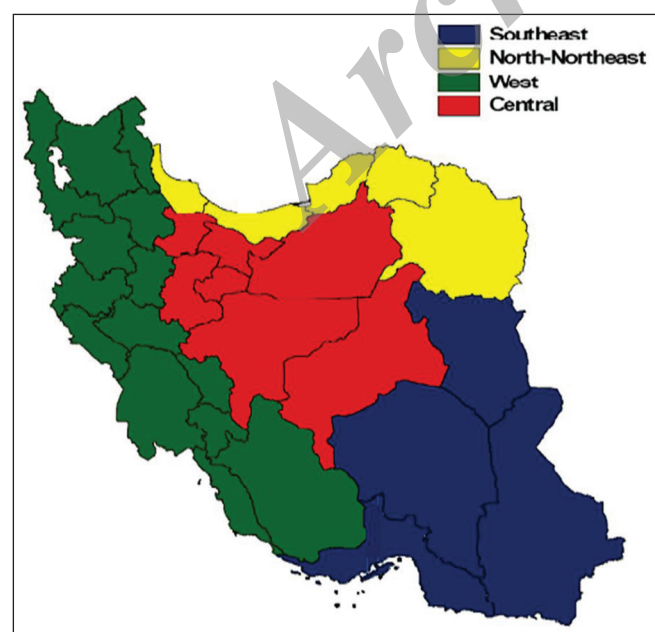


Figure 1: Country regions^[19]

RESULTS

In this nationwide survey, 13,486 out of 14,880 selected students completed the study (response rate of 90.6%). They consisted of 6640 girls (49.2%) and 6846 boys (50.8%) with one of their parents, 75.6% from urban areas. For this part of study, the data of 13,367 students was complete, 1148 students from southeast (lowest SES), 2358 from north-northeast (second low SES), 6038 from west (second high SES), and 3823 from central (highest SES) regions [Table 1], the mean SBP (95% CI) of total population studied was 101.5 (101.2-101.7) mmHg and the mean DBP was 64.8 (64.6-64.9) mmHg. Prevalence rate (95% CI) of high SBP, high DBP, and high SBP, and/or DBP in the total population studied was 0.9 (0.7-1.1), 3.0 (2.5-3.6) and 3.7 (3.2-4.3) percent, respectively.

The data according to the four Iran regions are presented in Table 1. It shows a significant difference in the prevalence rate of high SBP and/or DBP between four regions: Southeast area, the lowest SES region, with a prevalence rate of 7.4% (4.4-12.2) has the highest rate ($P = 0.004$). The prevalence rate of high DBP across these regions shows similar pattern of difference ($P = 0.001$), but the corresponding figure was not different for high SBP rate among these four regions ($P = 0.228$).

The distribution of mean SBP and DBP values, as well as the prevalence rate of HBP across provinces, is depicted in Figures 2-4, respectively. They demonstrate that except some areas, higher values of mean BP and frequency of HBP are accumulated in high SES regions (central, west, and north regions).

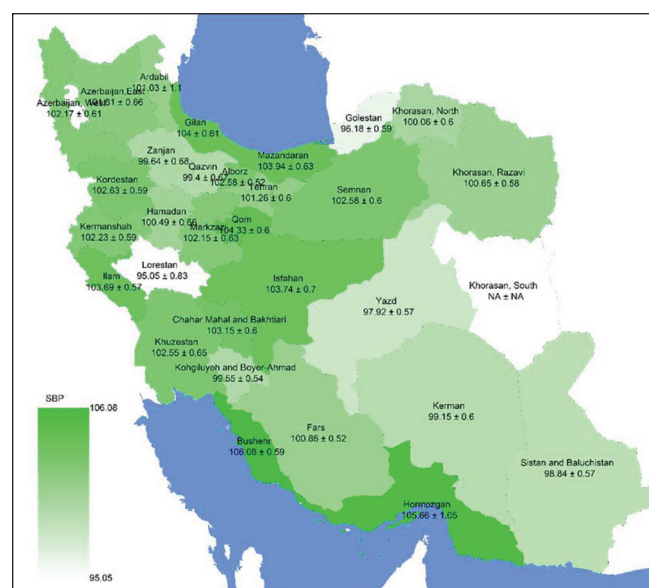


Figure 2: The mean of systolic blood pressure in Iranian children and adolescents at provincial level: The CASPIAN-IV study. Data are presented as mean ± standard error

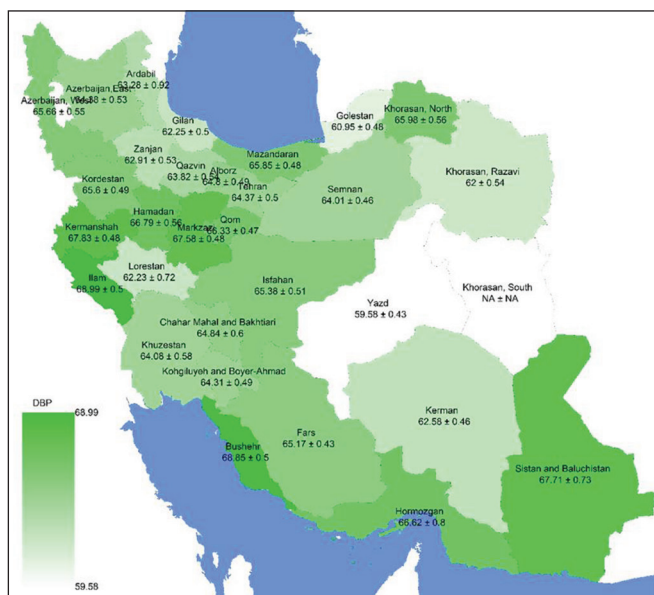


Figure 3: The mean of diastolic blood pressure in Iranian children and adolescents at provincial level: The CASPIAN-IV study. Data are presented as mean \pm standard error

Detailed information on mean BP and HBP prevalence rate of each province are presented in Appendix 1.

DISCUSSION

This study, which to the best of our knowledge is the first study of its kind in the Middle East and North Africa region, revealed significant differences in mean BP and frequency of HBP of children and adolescents according to the SES of their living area.

In the current study, the region with highest SES (central) had the lowest rate of HBP, whereas the region with lowest SES (southeast) had the highest rate of HBP.

The documented differences may have different causes. Considering demographics, the mean age ($P = 0.91$) and sex frequency ($P = 0.68$) of participants did not differ in the four regions. However, the proportions of living area in terms of urban and rural residence were not exactly the same ($P < 0.001$). The southeast region has the highest proportion of rural participants. Other than that, this region is considerably far from the metropolitan part of the country,^[26] therefore it can be expected to have the most common health problems. Our findings are in line with a study in Sweden that documented the effect of social inequity on BP.^[27] In Nigeria, a higher rate of elevated DBP, has been recorded in nonurban inhabitants.^[28] Our finding on very high frequency of elevated DBP in one province of that region is also consistent with a study in China, in which in a specific coastal region, unexpectedly high prevalence rate of HBP (26.22% for boys and 20.27% for girls) is reported.^[29]

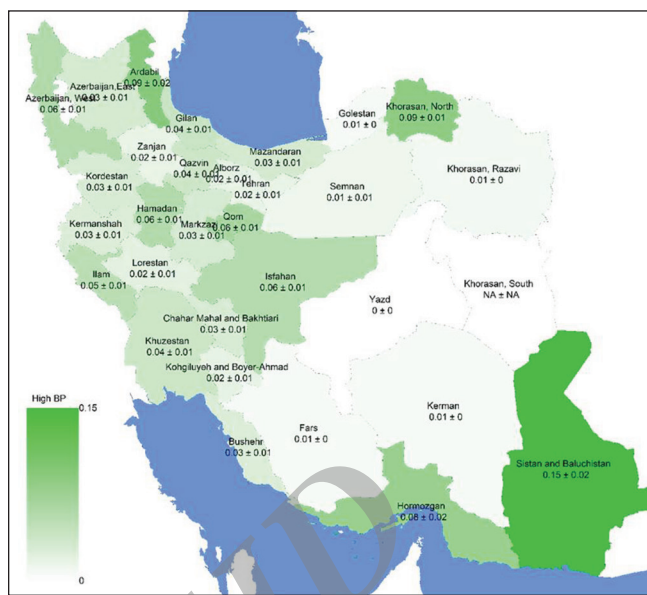


Figure 4: The prevalence of high systolic and/or diastolic blood pressure in Iranian children and adolescents at provincial level: The CASPIAN-IV study. Data are presented as prevalence \pm standard error

Ethnic issues may affect the situation, as well. That part of Iran has some ethnic similarities with south Asian countries as Pakistan, which have shown considerably high prevalence rates of HTN in some reports.^[12,30,31] Other region-specific factors, as dietary habits,^[32] may contribute to the situation, SES is another determining parameter. Some recent meta-analyses have studied the association of SES with HBP.^[16,17] One of them concluded that in low- and middle-income rural parts of the world, income as a part of SES is a major factor positively associated with HTN, but the educational level association with HTN varies with geographical region.^[16] Other meta-analysis which is not confined to lower income countries has depicted the inverse association of SES especially the level of education with BP.^[17] Therefore socioeconomic parameters may affect health situation relative to the epidemiologic transition stage which the region lies in. It is important to search the issue considering the complex interaction of possible determinants.^[33] Hence the underlying causes of large difference of the southeast region with other provinces of Iran should be determined in future studies, however, technical problems in measuring BP should be considered as well.

Among three other regions, the north-northeast area, the second low SES region, has the second high HBP rate. This region has the highest mean of BMI, which affects the BP situation. As explained earlier SES is contributing to results as well.

The second high SES (west) region results are almost similar to the second low SES (north-northeast) region. Both regions

Table 1: Some anthropometric and blood pressure indices in national and regional level by sex and living area: the CASPIAN-IV study

Region: Category	n (%)	Age (years)	SBP (mm Hg) ^a	DBP (mm Hg) ^a	High SBP (%) ^b	High DBP (%) ^b	High SBP and/or DBP (%) ^b
Southeast							
Boys	539 (47)	12.7 (11.9-13.6)	101.8 (100.5-103)	65.3 (64.2-66.3)	0.9 (0.3-2.4)	5.9 (2.7-12.2)	7.2 (3.7-13.6)
Girls	609 (53)	12.1 (11.4-12.9)	99.4 (98.3-100.4)	65.4 (64.3-66.4)	0.4 (0.1-1.4)	7.5 (3.5-15.5)	7.7 (3.6-15.6)
Urban	630 (54.9)	13.0 (12.2-13.8)	102.4 (101.2-103.5)	66.5 (65.4-67.5)	0.7 (0.3-1.8)	6.6 (3.2-13.2)	7.3 (3.6-14.0)
Rural	518 (45.1)	11.7 (10.8-12.5)	98.2 (97.0-99.3)	64.0 (62.9-65)	0.5 (0.1-2.3)	6.9 (2.8-15.9)	7.7 (3.4-16.5)
Total	1148 (100) (8.6% of study population)	12.4 (11.8-13.0)	100.5 (99.6-101.3)	65.4 (64.6-66.1)	0.6 (0.3-1.4)	6.8 (3.9-11.5) [†]	7.4 (4.4-12.2) [†]
North-northeast							
Boys	1188 (50.3)	12.2 (11.7-12.7)	101.6 (100.8-102.3)	64.5 (63.8-65.1)	1.1 (0.5-2.2)	4.5 (2.7-7.3)	5.5 (3.5-8.5)
Girls	1170 (49.7)	12.7 (12.1-13.2)	100.3 (99.5-101.0)	62.2 (61.5-62.8)	0.4 (0.1-1.1)	1.1 (0.5-2.4)	1.6 (0.9-2.9)
Urban	1711 (72.5)	12.8 (12.4-13.3)	102.2 (101.5-102.8)	64.4 (63.8-64.9)	0.8 (0.4-1.6)	3.4 (2.1-5.4)	4.2 (2.8-6.3)
Rural	647 (27.4)	11.4 (10.7-12.0)	97.6 (96.6-98.5)	60.6 (59.7-61.4)	0.4 (0.1-1.9)	1.3 (0.4-3.9)	1.8 (0.7-4.3)
Total	2358 (100) (17.6% of study population)	12.4 (12.1-12.8)	100.9 (100.3-101.4)	63.4 (62.9-63.8)	0.7 (0.4-1.3)	2.8 (1.8-4.3) [†]	3.6 (2.4-5.1) [†]
West							
Boys	3050 (50.5)	12.5 (12.2-12.8)	103.5 (103.0-103.9)	66.6 (66.1-67.0)	1.3 (0.9-1.9)	3.3 (2.4-4.5)	4.2 (3.2-5.5)
Girls	2988 (49.5)	12.4 (12.1-12.7)	99.9 (99.4-100.3)	64.5 (64.0-64.9)	0.2 (0.1-0.5)	2.4 (1.5-3.7)	2.7 (1.8-4.0)
Urban	4536 (75.1)	12.9 (12.6-13.1)	103.0 (102.6-103.3)	66.2 (65.8-66.5)	0.9 (0.6-1.3)	3.0 (2.2-3.9)	3.7 (2.9-4.7)
Rural	1502 (24.9)	11.2 (10.7-11.7)	97.9 (97.2-98.5)	63.5 (62.9-64.0)	0.3 (0.1-0.7)	2.5 (1.3-4.8)	2.7 (1.5-5.0)
Total	6038 (100) (45.2% of study population)	12.4 (12.1-12.7)	101.7 (101.3-102)	65.6 (65.3-65.8)	0.8 (0.5-1.1)	2.8 (2.2-3.7) [†]	3.5 (2.8-4.3) [†]
Central							
Boys	2012 (52.7)	12.0 (11.6-12.4)	102.6 (101.9-103.2)	64.6 (64.1-65.0)	1.2 (0.8-2.0)	2.9 (2.1-4.1)	3.5 (2.6-4.8)
Girls	1811 (47.3)	12.8 (12.4-13.3)	100.7 (100.1-101.2)	64.3 (63.8-64.7)	1.2 (0.5-2.4)	1.7 (1.0-2.7)	2.5 (1.6-3.8)
Urban	3223 (84.4)	12.5 (12.2-12.9)	102.2 (101.7-102.6)	64.7 (64.3-65)	1.4 (0.9-2.2)	2.3 (1.7-3.2)	3.1 (2.4-4.1)
Rural	600 (15.6)	11.6 (10.8-12.4)	98.8 (97.7-99.8)	63.5 (62.5-64.4)	0.1 (0.0-1.1)	2.3 (1.0-4.9)	2.5 (1.1-5.1)
Total	3823 (100) (28.6% of study population)	12.4 (12.1-12.7)	101.7 (101.2-102.1)	64.4 (64.0-64.7)	1.2 (0.8-1.18)	2.3 (1.8-3.1) [†]	3.0 (2.4-3.9) [†]
National							
Boys	6789 (50.7)	12.3 (12.1-12.5)	102.7 (102.3-103.0)	65.5 (65.2-65.7)	1.2 (0.9-1.6)	3.6 (2.9-4.4)	4.5 (3.7-5.4)
Girls	6578 (49.3)	12.5 (12.3-12.7)	100.2 (99.8-100.5)	64.1 (63.8-64.3)	0.5 (0.3-0.9)	2.4 (1.8-3.3)	2.9 (2.2-3.8)
Urban	10100 (75.5)	12.8 (12.6-12.9)	102.6 (102.3-102.8)	65.4 (65.1-65.6)	1.0 (0.8-1.4)	3.1 (2.5-3.7)	3.8 (3.2-4.5)
Rural	3267 (24.5)	11.4 (11.1-11.7)	98.1 (97.6-98.5)	63.2 (62.8-63.5)	0.3 (0.1-0.6)	2.9 (1.9-4.5)	3.3 (2.2-4.9)
Total	13367 (100) (100% of study population)	12.4 (12.3-12.5)	101.5 (101.2-101.7)	64.8 (64.6-64.9)	0.9 (0.7-1.1)	3.0 (2.5-3.6)	3.7 (3.2-4.3)

^aMean (95% CI); ^bPrevalence (95% CI); [†]Significant difference ($P = 0.0048$); [‡]Significant difference ($P = 0.0018$). The difference between mean age and sex frequency was not significant between four regions ($P = 0.91$ and 0.68 respectively); The difference between living area frequency was significant between four regions ($P < 0.001$). CI = Confidence interval; CASPIAN = Childhood and adolescence surveillance and prevention of adult noncommunicable disease; SBP = Systolic blood pressure; DBP = Diastolic blood pressure

have intermediate SES and show intermediate prevalence rates of HBP between four regions.

In our study, the central part of the country, which has the highest SES and is the most industrialized and urbanized region, had the lowest rate of HBP. The overall higher level of SES may contribute to a better health status through better education, attitude and practice of residents, and better health facilities.^[17,18] On the other hand, the higher SES, could result in higher levels of BP through unhealthier lifestyle and environmental exposures. In this region, the overall effect has been toward the better health outcome. These can be explained by the interaction of SES, ethnic issues, environmental circumstances, as well as dietary and physical activity habits.^[34,35] They need to be investigated through following region-specific studies.

Study strengths and limitations

It is a large-scale epidemiologic study which covers different age groups, genders, SESs and ethnicities of Iranian pediatric population recruited through random cluster sampling. It provides sufficient information to delineate present situation. However, it is a cross-sectional survey and has its expected limitations such as being unable to reveal causality relationships.

CONCLUSION

The relatively high prevalence rate of HBP in the pediatric population of some areas of Iran deserves more attention. Due to the complex nature of contributing factors, it is necessary to design and conduct complementary research projects specific to every region.

Appendix 1: The mean (95% CI) and prevalence rate of HBP (95% CI) in provincial level by sex and living area: The CASPIAN-IV study

Province	SBP (mmHg)	DBP (mmHg)	High DBP (%)	High SBP (%)	High SBP and/or DBP (%)
Eastern Azerbaijan					
Boys (n=247)	101.5 (97.2, 105.9)	63.2 (59.8, 66.7)	3.4 (1, 11.3)	2.5 (0.9, 7.2)	4.7 (1.7, 12.1)
Girls (n=235)	102.1 (98.2, 106.0)	65.5 (62.6, 68.5)	0.9 (0, 3.4)	0.9 (0.22, 3.4)	1.7 (0.5, 5.5)
Urban (n=393)	102.2 (98.8, 105.6)	64.6 (62.1, 67.0)	2.3 (0.8, 7.2)	1.8 (0.7, 4.7)	3.4 (1.4, 7.9)
Rural (n=89)	99.8 (95.1, 104.4)	63.3 (57.0, 69.6)	1.3 (0.2, 7.7)	1.3 (0.2, 7.7)	2.5 (0.4, 14.8)
Total (n=482)	101.8 (98.8, 104.8)	64.4 (62.1, 66.6)	2.1 (0.8, 6)	1.7 (0.7, 4.1)	3.2 (1.4, 7.1)
Western Azerbaijan					
Boys (n=238)	105.9 (102.5, 109.3)	66.7 (63.2, 70.3)	4.6 (0.8, 6)	2.1 (0.8, 5.4)	6.2 (2.1, 17.3)
Girls (n=238)	98.4 (95.2, 101.5)	64.6 (61.5, 67.6)	5.4 (1.8, 15.6)	0	5.4 (1.8, 15.6)
Urban (n=317)	102.1 (98.8, 105.4)	65.4 (62.1, 68.7)	6 (2, 16.7)	1.3 (0.4, 4)	6.9 (2.6, 16.9)
Rural (n=159)	102.3 (97.6, 107)	66.2 (62.9, 69.5)	3.1 (1, 9)	0.6 (0.1, 4.2)	3.7 (1.2, 11.2)
Total (n=476)	102.2 (99.4, 104.9)	65.7 (63.2, 68.1)	5 (2, 11.9)	1 (0.4, 2.9)	5.9 (2.6, 12.5)
Ardabil					
Boys (n=80)	101.0 (90.9, 111.2)	65(58.8, 71.2)	8.8 (2.4, 27.3)	5 (1.8, 13.2)	10 (3.3, 26.7)
Girls (n=137)	101.0 (96.3, 105.8)	62.3 (57.1, 67.5)	7.9 (3.7, 16.1)	0.7 (0.1, 4.2)	8.6 (4.2, 17)
Urban (n=177)	102.7 (97.3, 108.1)	64.0 (59.4, 68.6)	10.1 (5.3, 18.4)	2.2 (0.7, 6.6)	10.6 (5.7, 18.9)
Rural (n=40)	93.5 (87.2, 99.8)	60 (53.7, 66.3)	0	2.5 (0.4, 13.3)	2.5 (0.4, 13.3)
Total (n=217)	101.0 (96.2, 105.8)	63.3 (59.3, 67.3)	8.2 (4.2, 15.6)	2.3 (0.9, 5.8)	9.1 (4.9, 16.3)
Gilan					
Boys (n=259)	104.9 (101.2, 108.6)	62.9 (59.6, 66.2)	3.1 (0.9, 10.4)	2.7 (1, 7.4)	5.8 (2.213, 14.2)
Girls (n=220)	102.9 (99.8, 106)	61.5 (58.8, 64.2)	1.8 (0.6, 5.6)	0.5 (0.1, 3.1)	2.3 (0.8631, 5.9)
Urban (n=369)	104.2 (101.4, 107.0)	62.4 (59.9, 64.9)	3.2 (1.3, 7.9)	1.6 (0.5, 4.8)	4.9 (2.2, 10.6)
Rural (n=110)	103.3 (98.1, 108.4)	61.7 (57.3, 66.1)	0	1.8 (0.3, 11.3)	1.8 (0.3, 11.3)
Total (n=479)	104.0 (101.5, 106.5)	62.2(60.0, 64.4)	2.5 (1, 6.2)	1.7 (0.6, 4.3)	4.2 (1.9, 8.7)
Mazandaran					
Boys (n=236)	105.0 (100.7, 109.3)	67.2 (64.7, 69.7)	2.9 (1.4, 6.2)	2.5 (1, 6.5)	5 (2.5, 10.1)
Girls (n=232)	102.8 (99.2, 106.5)	64.4 (61.7, 67.1)	1.3 (0.2, 8.8)	0	1.3 (0.2, 8.8)
Urban (n=369)	104.9 (101.8, 108)	66.1 (64.2, 68.0)	1.6 (0.7, 3.9)	1.6 (0.6, 4.3)	3 (1.3, 6.5)
Rural (n=99)	100.3(92.7, 107.9)	64.7 (59, 70.5)	4 (0.6, 22.8)	0	4 (0.6, 22.8)
Total (n=468)	103.9 (101, 106.9)	65.8 (63.9, 67.8)	2.1 (0.8, 5.3)	1.3	3.2 (1.5, 6.8)
Golestan					
Boys (n=269)	96.1 (92, 100.2)	62.0 (58.9, 65.2)	1.5 (0.5, 4.6)	0	1.5 (0.5, 4.6)
Girls (n=210)	96.3 (93, 99.6)	59.5 (56.6, 62.4)	0	0	0
Urban (n=270)	97.0 (93, 101.1)	62.1 (59.3, 64.9)	0.7 (0.2, 2.8)	0	0.7 (0.2, 2.8)
Rural (n=209)	95.1 (91.4, 98.7)	59.4 (55.8, 63.0)	1 (0.1, 6.4)	0	1 (0.1, 6.4)
Total (n=479)	96.2 (93.4, 99)	60.9 (58.7, 63.2)	0.8 (0.3, 2.7)	0	0.8 (0.3, 2.7)
Northern Khorasan					
Boys (n=270)	100.6 (97.7, 103.6)	68.0 (64.5, 71.6)	12.2 (6.1, 22.9)	0	12.2 (6.1, 22.9)
Girls (n=205)	99.3 (95.1, 103.5)	63.3 (59.9, 66.6)	2.4 (0.8, 7.1)	1.5 (0.4, 5.8)	3.9 (1.7, 8.5)
Urban (n=349)	102.2 (99.2, 105.2)	68.4 (65.6, 71.2)	10 (5.1, 18.7)	0.9 (0.2, 3.6)	10.8 (5.8, 19.3)
Rural (n=126)	94.2 (91.3, 97.0)	59.2 (54.7, 63.7)	2.4 (0.6, 8.9)	0	2.4 (0.6, 8.9)
Total (n=475)	100.1 (97.5, 102.6)	66 (63.3, 68.6)	8 (4.2, 14.6)	0.6 (0.1, 2.7)	8.6 (4.7, 15.1)
Khorasan Razavi					
Boys (n=150)	102 (97.6, 106.4)	61.1 (58.2, 64.2)	1.3 (0.9, 2)	0	1.3 (0.9, 2)
Girls (n=300)	100 (97.3, 102.6)	62.4 (59.2, 65.6)	0.7 (0.1, 4.6)	0.3 (0, 2.3)	1 (0.2, 4.2)
Urban (n=350)	101.2 (98.4, 104.0)	62.7(59.9, 65.6)	1.1 (0.4, 3)	0	1.1 (0.4, 3)
Rural (n=100)	98.6 (95.5, 101.6)	59.4 (56.1, 62.7)	0	1 (0.1, 6.5)	1 (0.1, 6.5)
Total (n=450)	100.6 (98.3, 103)	62 (59.7, 64.3)	0.9 (0.3, 2.4)	0.2 (0, 1.6)	1.1 (0.5, 2.7)
Sistanvabaluchestan					
Boys (n=192)	98.3 (94.5, 102.0)	65.3 (60.6, 70.0)	9.9 (4, 22.7)	0	9.9 (4, 22.7)
Girls (n=233)	99.3 (96.0, 102.6)	69.7 (64.0, 75.4)	18.5 (10.4, 30.9)	0	18.5 (10.4, 30.8)
Urban (n=219)	100 (95.9, 104.0)	69 (63.4, 74.5)	13.7 (6.2, 27.7)	0	13.7 (6.2, 27.7)

(continued)

Appendix 1: (Continued)

Province	SBP (mmHg)	DBP (mmHg)	High DBP (%)	High SBP (%)	High SBP and/or DBP (%)
Rural (n=206)	97.7 (94.5, 100.9)	66.4 (60.9, 72)	15.4 (7.1, 30.1)	0	15.4 (7.1, 30.1)
Total (n=425)	98.8 (96.2, 101.4)	67.7 (63.8, 71.6)	14.6 (11.5, 18.3)	0	14.6 (11.5, 18.3)
Hormozgan					
Boys (n=142)	109.3 (101.6, 117)	70.1 (64.4, 75.7)	9.1 (3.6, 21.1)	2.8 (0.9, 8.1)	13.3 (6, 27)
Girls (n=126)	101.6 (96.1, 107.1)	62.7 (59.4, 66.1)	0.8 (0.1, 5.2)	0.8 (0.1, 5.2)	1.6 (0.4, 6)
Urban (n=129)	106.8 (98.3, 115.4)	68.3 (62.0, 74.6)	7.7 (2.2, 23.3)	1.5 (0.4, 5.3)	10 (3.136, 27.6)
Rural (n=139)	104.5 (98.3, 110.8)	65.1 (60.3, 69.8)	2.9 (1.2, 6.6)	2.1 (0.5, 8.3)	4.6 (0.9, 20.3)
Total (n=268)	105.7 (100.4, 110.9)	66.6 (62.7, 70.5)	5.2 (2.1, 12.3)	1.8 (0.7, 4.9)	7.8 (3.5, 16.5)
Bushehr					
Boys (n=249)	107.6 (104.2, 111)	71.1 (68, 74.3)	3.2 (0.9, 10.7)	0.8 (0.2, 2.9)	3.6 (1.2, 10.6)
Girls (n=216)	104.3 (101.4, 107.3)	66.2 (63.6, 68.9)	1.8 (0.6, 5.7)	0.5 (0.1, 3.1)	1.8 (0.6, 5.7)
Urban (n=427)	106.6 (104.1, 109.1)	68.7 (66.3, 71.1)	2.8 (1.1, 6.9)	0.7 (0.2, 2)	36 (1.3, 7)
Rural (n=38)	100.1 (91.2, 109.0)	70.4 (65, 75.8)	0	0	0
Total (n=465)	106.1 (103.6, 108.5)	68.8 (66.6, 71.1)	2.6 (1, 6.3)	0.6 (0.2, 1.9)	2.8 (1.2, 6.4)
Khoozestan					
Boys (n=222)	103.8 (99.7, 107.9)	62.6 (58.9, 66.2)	0.4 (0.1, 3.1)	1.8 (0.6, 5.6)	1.8 (0.6, 5.6)
Girls (n=198)	101.1 (97.2, 105)	65.8 (60.9, 70.7)	6.2 (1.2, 27)	0	6.2 (1.2, 27)
Urban (n=351)	103.1 (100.2, 106.1)	63.3 (59.9, 66.78)	0.9 (0.3, 2.4)	1.1 (0.4, 3.7)	1.7 (0.7, 4.1)
Rural (n=69)	100.1 (91.2, 109.0)	67.8 (57.1, 78.5)	14.5 (2, 58.8)	0	14.5 (2, 58.8)
Total (n=420)	102.5 (99.7, 105.3)	64.1 (60.6, 67.5)	3.1 (0.7, 13.5)	1 (0.3, 3.1)	3.9 (1.1, 13)
Ilam					
Boys (n=257)	105.6 (102.4, 108.7)	70.3 (67.5, 73.1)	3.5 (1.5, 7.6)	1.2 (2, 7.7)	4.6 (2.2, 9.6)
Girls (n=220)	101.4 (98.1, 104.8)	67.4 (63.9, 70.9)	5 (1.8, 12.9)	0.9 (0.1, 6.1)	5.9 (2.3, 14.1)
Urban (n=398)	104.0 (101.1, 107)	69.4 (66.6, 72.1)	4.5 (2.2, 8.9)	1.2 (0.3, 5)	5.8 (3.1, 10.6)
Rural (n=79)	101.8 (97.7, 106)	67 (63.1, 70.9)	2.5 (0.4, 14.7)	0	2.5 (0.4, 14.7)
Total (n=477)	103.7 (101.1, 106.2)	69 (66.6, 71.3)	4.2 (2.2, 7.9)	1 (0.3, 4.2)	5.2 (2.9, 9.3)
Kermanshah					
Boys (n=261)	103 (99.9, 106.0)	68.5 (66.1, 71)	2.7 (0.9, 7.3)	0.8 (0.2, 2.9)	3.8 (1.8, 7.9)
Girls (n=219)	101.3 (97.7, 105)	67 (64.6, 69.3)	0.9 (0.2, 3.4)	0.5 (0.1, 3.1)	1.4 (0.5, 3.9)
Urban (n=390)	103.3 (100.8, 105.9)	68.8 (66.9, 70.8)	2.1 (0.8, 5.2)	0.5 (0.1, 2)	2.8 (1.4, 5.7)
Rural (n=90)	97.4 (92.6, 102.1)	63.4 (60.9, 65.9)	1.1 (0.2, 6.9)	1.1 (0.2, 6.9)	2.2 (0.6, 7.4)
Total (n=480)	102.2 (99.9, 104.6)	67.8 (66.1, 69.6)	1.9 (0.7875, 4.398)	0.6 (0.2, 1.9)	2.7 (1.4, 5.1)
Kordestan					
Boys (n=262)	104.1 (100.6, 107.6)	66.7 (64.5, 68.9)	2.6 (0.934, 7.1)	2.5 (0.9, 5.8)	4.9 (2.3, 9.8)
Girls (n=209)	100.8 (98.4, 103.2)	64.29 (61.8, 66.6)	0.5 (0.1, 3.2)	0	0.5 (0.1, 3.2)
Urban (n=323)	105.2 (102.7, 107.8)	68.1 (66.4, 69.8)	2.1 (0.7, 5.9)	1.8 (0.7, 4.8)	3.9 (1.9, 8.2)
Rural (n=148)	96.9 (92.7, 101.2)	60.0 (57.0, 63.1)	0.7 (0.1, 4.4)	0	0.7 (0.1, 4.4)
Total (n=471)	102.6 (100.2, 105.1)	65.6 (63.7, 67.4)	1.7 (0.7, 4.3)	1.3 (0.5, 3.4)	2.9 (1.4, 5.9)
Hamedan					
Boys (n=239)	102.6 (98.9, 106.3)	67.4 (64.4, 70.5)	6.7 (3.3, 13.1)	1.7 (0.7, 4.1)	8 (4.4, 14.1)
Girls (n=230)	98.2 (95.1, 101.4)	66.1 (62.9, 69.3)	3.5 (1, 11.5)	0	3.5 (1, 11.5)
Urban (n=338)	103.9 (101.5, 106.4)	69.1 (66.9, 71.4)	5.3 (2.7, 10.1)	1.2 (0.5, 3)	6.2 (3.5, 11)
Rural (n=131)	91.5 (85.8, 97.2)	60.7 (55.5, 65.8)	4.5 (0.9, 20.3)	0	4.6 (0.9, 20.3)
Total (n=469)	100.5 (97.6, 103.4)	66.8 (64.3, 69.2)	5.1 (2.7, 9.5)	0.9 (0.3, 2.2)	5.8 (3.2, 10)
Zanjan					
Boys (n=192)	102.3 (97.3, 107.3)	64 (60.3, 67.7)	2.8 (1.1, 7)	0.5 (1, 3.6)	2.8 (1.1, 7)
Girls (n=251)	97.7 (95.1, 100.2)	62.1 (60.1, 64.2)	0.8 (0.2, 3)	0.4 (1, 2.7)	1.2 (0.4, 3.4)
Urban (n=279)	101.0 (97.4, 104.6)	62.5 (60.1, 64.8)	1.9 (0.7, 4.9)	0.7 (0.2, 2.8)	2.2 (1, 5.17)
Rural (n=164)	97.4 (92.5, 102.2)	63.6 (59.5, 67.7)	1.2 (0.3, 4.4)	0	1.2 (0.3, 4.4)
Total (n=443)	99.6 (96.7, 102.6)	62.9 (60.8, 65.1)	1.6 (0.7, 3.5)	0.5 (0.1, 1.8)	1.8 (0.9, 3.8)
Markazi					
Boys (n=277)	102.7 (98.5, 106.9)	68.6 (65.9, 71.3)	2.9 (1.3, 6.1)	1.8 (0.6, 5.4)	3.9 (2, 7.7)
Girls (n=199)	101.4 (97.9, 104.8)	66.1 (63.3, 68.9)	2 (0.6, 6)	0.5 (0.1, 3.4)	2 (0.7, 6)

(continued)

Appendix 1: (Continued)

Province	SBP (mmHg)	DBP (mmHg)	High DBP (%)	High SBP (%)	High SBP and/or DBP (%)
Urban (n=367)	103.2 (99.9, 106.5)	68.7 (66.3, 71.0)	3 (1.5, 5.7)	1.6 (0.6, 4.3)	3.8 (2, 6.9)
Rural (n=109)	98.5 (92.3, 104.8)	63.9 (60.2, 67.6)	0.9 (0.1, 5.9)	0	0.9 (0.1, 5.9)
Total (n=476)	102.1 (99.2, 105.1)	67.6 (65.5, 69.6)	2.5 (1.3, 4.7)	1.3 (0.5, 3.4)	3.1 (1.7, 5.6)
Qazvin					
Boys (n=241)	101.7 (96.8, 106.6)	65.2 (61.6, 68.7)	3.8 (1.9, 7.5)	1.7 (0, 1.5)	5 (2.7, 9.3)
Girls (n=238)	97.1 (93.9, 100.2)	62.4 (60.1, 64.7)	2.5 (0.8, 8.1)	0	2.5 (0.8, 8.1)
Urban (n=359)	99.7 (95.9, 103.6)	63.2 (63.2, 65.9)	2.5 (1.2, 5.1)	1.1 (0.3, 3.5)	3.4 (1.7, 6.4)
Rural (n=120)	98.3 (95.6, 101.1)	65.6 (62.6, 68.7)	5 (1.3, 18.2)	0	5 (1.3, 18.2)
Total (n=479)	99.4 (96.4, 96.4)	63.8 (61.7, 66)	3.1 (1.6, 6.3)	0.8 (0.3, 2.7)	3.8 (2, 7)
Qom					
Boys (n=235)	109.0 (105.5, 112.5)	69.8 (67.3, 72.3)	10.5 (6.2, 17.1)	2.5 (1.1, 5.7)	11.3 (6.8, 18.1)
Girls (n=239)	99.6 (97.3, 102.0)	62.8 (60.4, 65.3)	0.4 (0.1, 2.9)	1.3 (0.4, 3.6)	1.7 (0.5, 5.2)
Urban (n=454)	104.4 (101.9, 106.9)	66.3 (64.3, 68.4)	5.5 (3.1, 9.5)	1.8 (0.8, 3.6)	6.3 (3.8, 10.4)
Rural (n=20)	101.7 (89.6, 113.9)	66.2 (59.0, 73.5)	5 (1.2, 18.7)	5 (1.2, 18.7)	10 (2.3, 34.5)
Total (n=474)	104.3 (101.9, 106.8)	66.3 (64.3, 68.3)	5.4 (3.1, 9.3)	1.9 (1, 3.7)	6.5 (4, 10.5)
Tehran					
Boys (n=238)	101.9 (98.3, 105.4)	62.7 (59.4, 66)	1.3 (0.3, 5.2)	0.8 (0.1, 5.6)	1.7 (0.4, 7.4)
Girls (n=229)	100.6 (97.2, 104)	66.1 (63.4, 68.8)	1.3 (0.5, 3.8)	0.9 (0.3, 3.3)	2.2 (1, 4.7)
Urban (n=447)	101.1 (98.5, 103.7)	64.3 (62, 66.7)	1.3 (0.5, 3.3)	0.9 (0.3, 2.9)	2 (0.9, 4.5)
Rural (n=20)	104.5 (96.9, 112.1)	65 (59.4, 70.5)	0	0	0
Total (n=467)	101.2 (98.7, 103.8)	64.4 (62.1, 66.6)	1.3 (0.5, 3.1)	0.9 (0.3, 2.8)	1.9 (0.9, 4.3)
Semnan					
Boys (n=236)	102.7 (98.5, 106.9)	62.7 (59.4, 66.1)	0.9 (0.1, 5.6)	1.3 (0.3, 5.1)	1.2 (0.3, 5.1)
Girls (n=239)	102.4 (98.8, 106.0)	65.3 (63, 67.6)	0.4 (0.1, 2.9)	1.3 (0.2, 8.3)	1.7 (0.4, 7.4)
Urban (n=406)	103.4 (100.4, 106.4)	64 (61.6, 66.3)	0.7 (0.2, 3.1)	1.5 (0.5, 4.8)	1.7 (0.6, 4.9)
Rural (n=69)	97.6 (91.1, 91.2)	64.2 (60.1, 68.3)	0	0	0
Total (n=475)	102.6 (99.8, 105.3)	64.0 (61.9, 66.1)	0.6 (0.2, 2.6)	1.3 (0.4, 4.1)	1.5 (0.5, 4.2)
Isfahan					
Boys (n=261)	103.4 (99.0, 107.8)	64.9 (62.4, 67.4)	3 (1.3, 7)	1.9 (0.6, 5.8)	3.8 (1.7, 8.3)
Girls (n=217)	104.1 (100.6, 107.6)	66 (63.4, 68.6)	5 (1.9, 13)	5.5 (1.8, 15.4)	7.8 (3.4, 17.1)
Urban (n=390)	104.0 (100.6, 107.5)	65.5 (63.3, 67.6)	3.6 (1.5, 8.2)	4.3 (1.9, 9.8)	5.6 (2.8, 11.2)
Rural (n=88)	102.5 (99, 106)	64.9 (61.8, 67.9)	5.5 (2, 12)	0	5.5 (2, 12)
Total (n=478)	103.7 (100.9, 106.6)	65.4 (63.5, 67.2)	4 (2, 7.6)	3.5 (1.5, 8.1)	5.6 (3, 10.1)
Yazd					
Boys (n=277)	97.4 (93.5, 101.4)	59.1 (56.4, 61.8)	0.4 (0.1, 2.5)	0.4 (0, 2.5)	0.4 (1, 2.5)
Girls (n=199)	98.5 (95.4, 101.7)	60.2 (58.2, 62.3)	0	0	0
Urban (n=416)	99.2 (96.7, 101.8)	60.3 (58.6, 62)	0.2 (0, 1.7)	0.2 (0, 1.7)	0.2 (0, 1.7)
Rural (n=60)	88.8 (80.7, 97.0)	54.7 (47.9, 61.4)	0	0	0
Total (n=476)	97.9 (95.3, 100.6)	59.6 (57.8, 61.4)	0.2 (0, 1.5)	0.2 (0.0293, 1.5)	0.2 (0, 1.5)
Kerman					
Boys (n=199)	100.1 (96.2, 103.9)	62.0 (58.9, 65.2)	0	0.5 (0.1, 3.3)	0.5 (0.1, 3.3)
Girls (n=252)	98.4 (95.2, 101.6)	63 (60.8, 65.2)	1.2 (0.2806, 4.795)	0.8 (0.2, 3)	1.2 (0.3, 4.8)
Urban (n=285)	102.3 (99.5, 105.0)	64 (61.5, 66.5)	1 (0.3, 4.3)	1 (0.3, 3.1)	1.4 (0.4, 4.4)
Rural (n=166)	93.8 (90, 97.7)	60.2 (57.6, 62.7)	0	0	0
Total (n=451)	99.1 (96.6, 101.7)	62.6 (60.7, 64.5)	0.6 (0.2, 2.8)	0.7 (0.2, 2)	0.9 (0.3, 2.8)
Fars					
Boys (n=202)	100.8 (97.1, 104.6)	64.7 (61.5, 67.9)	1 (0.3, 3.6)	0.5 (1, 3.3)	1.5 (0.5, 4.1)
Girls (n=273)	100.7 (98.4, 103.3)	65.5 (63.5, 67.5)	0.4 (0.1, 2.5)	0	0.4 (0.1, 2.5)
Urban (n=347)	100.9 (98.1, 103.6)	64.9 (62.9, 66.8)	0.9 (0.3, 2.6)	0.3 (0, 2)	1.1 (0.5, 2.9)
Rural (n=128)	100.8 (98, 103.6)	65.9 (61.9, 69.9)	0	0	0
Total (n=475)	100.8 (98.7, 103)	65.2 (63.4, 66.9)	0.6 (0.267, 1.9)	0.2 (0, 1.5)	0.9 (0.3, 2.1)
Kohgiluyeh					
Boys (n=201)	101.6 (97.7, 105.5)	66.5 (62.9, 70.1)	3 (1.3, 6.8)	0.5 (0.1, 3.4)	3 (1.3, 6.8)

(continued)

Appendix 1: (Continued)

Province	SBP (mmHg)	DBP (mmHg)	High DBP (%)	High SBP (%)	High SBP and/or DBP (%)
Girls (n=247)	97.9 (95.5, 100.2)	62.5 (60.2, 64.9)	1.2 (0.3, 4.9)	0	1.2 (0.3, 4.9)
Urban (n=289)	100.2 (97.3, 103.2)	64.8 (62.0, 67.6)	2.7 (1.3, 6)	0.3 (0.1, 2.4)	2.8 (1.3, 6)
Rural (n=159)	98.3 (94.8, 101.8)	63.4 (60, 66.9)	0.6 (0.1, 4.2)	0	0.6 (1, 4.2)
Total (n=448)	99.5 (97.3, 101.8)	64.3 (62.1, 66.5)	2 (1, 4.2)	0.2 (.,1.6)	2 (1, 4.2)
Lorestan					
Boys (n=128)	95.8 (93.0, 98.7)	62.0 (58.5, 65.6)	1.6 (0.4, 5.6)	0.8 (0.1, 5.2)	2.3 (0.9, 6.3)
Girls (n=99)	94.0 (88.5, 99.5)	62.4 (56.3, 68.6)	2 (0.6, 6.4)	0	2 (0.6, 6.4)
Urban (n=168)	96.3 (92.9, 99.7)	63.1 (59.6, 66.6)	0.6 (0.1, 3.7)	0.6 (1, 4.1)	1.2 (0.3, 4.2)
Rural (n=59)	91.5 (86.4, 96.5)	59.7 (51.8, 67.5)	5 (1.9, 12.5)	0	5 (1.9, 12.5)
Total (n=227)	95.0 (92.0, 98.0)	62.2 (58.8, 65.6)	1.8 (0.6, 5)	0.4 (1, 3.1)	2.2 (0.9, 5.3)
Chaharmahal and Bakhtiari					
Boys (n=268)	106.7 (103.6, 109.8)	68.8 (65.2, 72.5)	4.4 (1.7, 11.4)	0.4 (0.1, 2.6)	4.4 (1.7, 11.4)
Girls (n=207)	98.6 (95.1, 102.1)	59.7 (56, 63.4)	5 (0.1, 3.2)	0	1 (0.3, 3.5)
Urban (n=331)	105.6 (102.9, 108.3)	66.1 (62.5, 69.6)	2.1 (0.6, 7.1)	0	2.4 (0.8, 7.1)
Rural (n=144)	97.5 (92.4, 102.7)	62.1 (56.6, 67.5)	4.1 (1, 15.3)	0.7 (1, 4.5)	4.1 (1, 15.3)
Total (n=475)	103.1 (100.5, 105.8)	64.8 (61.8, 67.8)	2.7 (1.1, 6.8)	0.2 (0, 1.5)	2.9 (1.2, 6.9)
Alborz					
Boys (n=231)	102.8 (100.0, 105.5)	64.2 (61.7, 66.6)	1.7 (0.7, 4.3)	0	1.7 (0.7, 4.3)
Girls (n=247)	102.4 (99.9, 104.9)	65.4 (63.4, 67.3)	2 (0.9, 4.4)	0.4 (1, 2.8)	2.4 (1.2, 4.8)
Urban (n=369)	102.9 (100.6, 105.2)	65.7 (63.9, 67.5)	2.1 (1.2, 4)	0.3 (0, 1.9)	2.4 (1.4, 4.3)
Rural (n=108)	101.4 (98.6, 104.3)	61.6 (58.9, 64.3)	0.9 (0.1, 5.8)	0	0.9 (0.1, 5.8)
Total (n=477)	102.6 (100.7, 104.4)	64.8 (63.2, 66.4)	1.9 (1, 3.4)	0.2 (0, 1.5)	2.1 (1.2, 3.6)

CI = Confidence interval; CASPIAN = Childhood and Adolescence Surveillance and Prevention of Adult Noncommunicable Disease; SBP = Systolic blood pressure; DBP = Diastolic blood pressure; HBP = High blood pressure

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Conflicts of interest

There are no conflicts of interest.

AUTHOR'S CONTRIBUTION

ZF: Contributions to concept/design, data interpretation, drafting of the manuscript, critical revision of the manuscript and approval of the article. RK: Contributions to concept/design, acquisition of data, data interpretation, drafting of the manuscript, critical revision of the manuscript and approval of the article. MEM, GA, RH: Contributions to concept/design, critical revision of the manuscript and approval of the article. AK, HA: Contributions to concept/design, data analysis/interpretation, critical revision of the

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