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Research Article

Prevalence and Determinants of Hypertension among Young Adults in Islamabad, Pakistan: Role of Lifestyle and Family History

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Abstract

Background: Hypertension is increasingly prevalent among young adults and contributes to long-term cardiovascular risk.

Objective: To determine the prevalence of hypertension and identify its predictors among young adults in Pakistan.

Methodology: The study was a descriptive cross-sectional study, which was carried out at International Islamic University, Islamabad, and COMSATS University Islamabad between March 2023 and February 2024. Stratified random sampling was used to recruit 800 participants aged 1835 years. Structured interviews and standardized measurements were utilized to gather information on demographic, lifestyle factors, family history, and clinical measurements. Blood pressure was taken on two occasions with two readings each time, and the average was taken. Body mass index (BMI) was determined. The definition of hypertension was based on systolic blood pressure of 140mmHg or greater, diastolic blood pressure of 90mmHg or greater or use of antihypertensive medication. The data were computed in SPSS 25 and subjected to descriptive statistics, chi-square, independent t-tests and logistic regression to determine significant predictors ($p<0.05$).

Results: The prevalence of hypertension was 20.00% (160/800) among participants. Hypertension was more common in males (23.81% vs. 15.79% in females), participants with overweight/obesity (BMI ≥25 kg/m²: 56.67%), positive family history (28.57% vs. 15.38%), sedentary lifestyle (27.27% vs. 11.11%), current smokers (31.25% vs. 17.19%), alcohol users (25.00% vs. 19.44%), and those with unhealthy diets (26.00% vs. 10.00%). Logistic regression showed age, male gender, BMI, family history, smoking, sedentary lifestyle, and unhealthy diet as independent predictors of hypertension.

Conclusion: One in five young adults in this university population has hypertension, with lifestyle and familial factors serving as key predictors.

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Introduction

One of the most common and adjustable risk factors of cardiovascular disease in the world is hypertension [1,2]. Previously viewed as the condition that is mainly common in middle-aged and older adults, recent data indicate that there have been increasing cases of the condition in young adults [3]. This tendency represents a considerable threat to the overall health of the population, since early hypertension onset subjects people to the long-term effects of the high blood pressure rates, predisposing them to cardiovascular, renal, and cerebrovascular disorders [4]. Also, hypertension among the younger generation does not manifest itself as perceived and thus it is not identified promptly, resulting in a high rate of morbidity in the long term [5].

The incidence of hypertension in young adults is very different throughout the world, as it depends on the lifestyle, socioeconomic status, genetic predisposition, and access to health care services [6]. The top causes include urbanization, high sodium and processed diets, sedentary living and rising obesity rates. Risk is further increased by psychosocial stress, smoking and alcohol consumption as well as having a family history of hypertension [7,9]. Although much research has been done in the high-income countries, low- and middle-income countries such as Pakistan have little data. Hypertension development in young adults in Pakistan might have different effects on socio-cultural, dietary, and environmental factors that are unique to Pakistan compared to other populations [10,11].

The prevalence and determinants of hypertension among young adults are crucial in understanding the prevention of the disease through the identification of high-risk groups. Even though national surveys demonstrate an increasing tendency in blood pressure among Pakistani young people, the results are usually incongruent as a result of a variation in the study design and measurement criteria. Thus, a dedicated study is required to offer precise information on prevalence and predictors in this group of people.

Research Objective

To determine the prevalence of hypertension and identify its predictors among young adults in Pakistan.

Materials and Methods

Study Design

The prevalence and predictors of hypertension among young adults were aimed at through a descriptive cross-sectional study.

Study Setting

The research was conducted in two higher educational institutions, one at the International Islamic University, Islamabad (IIUI) and the other at the COMSATS University Islamabad (CUI) and on the university fraternities.

Study Duration

Data collection was conducted over one year, from March 2023 to February 2024.

Study Population

The sample consisted of young adults aged 1835 years and being enrolled in the university. People who had been diagnosed with chronic illnesses (except hypertension) previously, pregnant women, and people who did not want to join the research were not included.

Sample Size and Sampling Technique

Eight hundred participants (400 IIUI and 400 CUI) were recruited using stratified random sampling to have a sample representative on the faculties and gender lines. Calculation of the sample size based on expected prevalence of hypertension of 25, 95% confidence level, and 5% margin of error gave 288 as the minimum participants per university. The sample size was used to represent the non-response problem and to provide sufficient power to regressively analyze multiple predictors with a sample size of 400 per university (i.e. 800 participants) and this size was deemed adequate to estimate prevalence and to identify significant predictors among the young adults.

Data Collection Methods

Data were gathered with the help of structured interviews and standardized measures. The pre-tested questionnaire was used to gather demographic information, lifestyle factors (diet, physical activity, smoking, alcohol use) and family history of hypertension. The blood pressure was assessed using a standard digital sphygmomanometer that had been validated. Measurement of BP was carried out on two occasions and two measurements were made at five minutes intervals during each occasion and the

data was averaged. Prior to every measure, the participants were made to sit and rest over a period of five minutes. Measures of height and weight were conducted to estimate body mass index (BMI). The definition of hypertension was in line with the WHO criteria; systolic blood pressure of 140 mmHg or diastolic blood pressure of 90 mmHg or taking antihypertensive medication now. The dependent variable was the status of hypertension. The independent variables were age, gender, BMI, family history, diet, physical activity, smoking and alcohol consumption.

Statistical Analysis

The data was entered and analyzed with the help of SPSS version 25, and the data entry was checked twice as well as randomly to maintain accuracy. Participant characteristics were summarized using descriptive statistics such as frequencies, percentages, means, and standard deviations and to calculate prevalence of hypertension. The chi-square and independent t-tests were used to test the relationship between hypertension and the categorical or continuous variables respectively. To determine the independent predictors of hypertension, Logistic regression analysis was conducted and a p-value of less than 0.05 was regarded as significant. Standardized measurement procedures were used in order to reduce bias.

Ethical Considerations

The Institutional Ethics Committee of International Islamic University, Islamabad gave the ethical approval. All participants were informed through written consent. The confidentiality and anonymity of the participants were highly observed.

Results

Among the 800 young adult participants, 220 (27.50%) were aged 18–22 years, 260 (32.50%) were 23–27 years, 200 (25.00%) were 28–32 years, and 120 (15.00%) were 33–35 years (Table 1). The majority were male (420; 52.50%) and 380 (47.50%) were female. Based on BMI, 360 (45.00%) had normal weight, 280 (35.00%) were overweight, 120 (15.00%) were obese, and 40 (5.00%) were underweight. Family history of hypertension was present in 280 participants (35.00%). Regarding lifestyle, 360 (45.00%) were physically active while 440 (55.00%) were sedentary. Smoking was reported by 160 (20.00%), and alcohol use by 80 participants (10.00%). Dietary habits indicated 300 (37.50%) followed a healthy diet and 500 (62.50%) had unhealthy dietary patterns.

Table 1: Demographic, Clinical, and Lifestyle Characteristics of Study Participants (N = 800)

Category	Subcategory	n	%
Age Group (years)	18–22	220	27.50
	23–27	260	32.50
	28–32	200	25.00
	33–35	120	15.00
Gender	Male	420	52.50
	Female	380	47.50
BMI Category (kg/m²)	Underweight (<18.5)	40	5.00
	Normal (18.5–24.9)	360	45.00
	Overweight (25–29.9)	280	35.00
	Obese (≥30)	120	15.00
Family History of Hypertension	Yes	280	35.00
	No	520	65.00
Physical Activity	Active	360	45.00
	Sedentary	440	55.00
Smoking Status	Current smoker	160	20.00
	Non-smoker	640	80.00
Alcohol Use	Yes	80	10.00
	No	720	90.00
Dietary Habits	Healthy diet	300	37.50
	Unhealthy diet	500	62.50

The overall prevalence of hypertension among participants was 20.00% (160/800), while 640 (80.00%) were normotensive (Figure 1). This highlights that one in five young adults in the study population had elevated blood pressure according to WHO criteria.

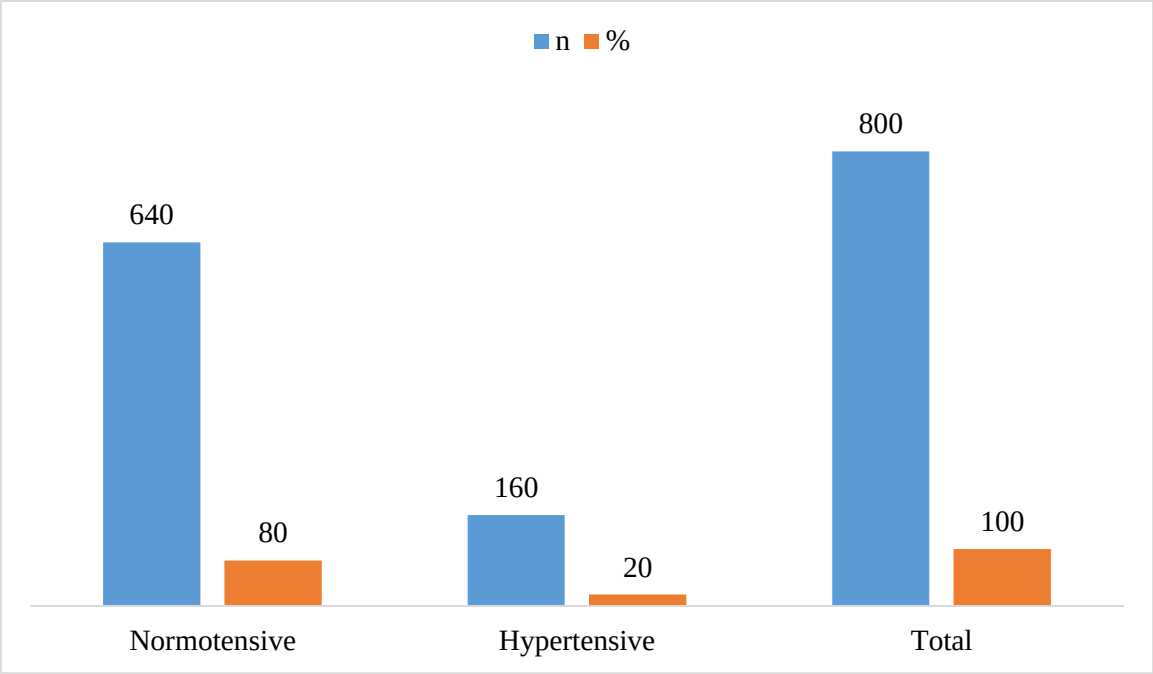

Figure 1: Prevalence of Hypertension among Participants (N = 800).

Hypertensive participants (n=160) had a significantly higher mean age of 27.10 ± 4.20 years compared to normotensive participants (n=640) with a mean age of 24.80 ± 3.80 years (p<0.001), shown in Table 2. Similarly, mean BMI was higher among hypertensives at 27.50 ± 4.80 kg/m² versus 23.80 ± 3.90 kg/m² in normotensives (p<0.001), indicating age and BMI as potential continuous risk factors for hypertension.

Table 2: Comparison of Continuous Variables between Hypertensive and Normotensive Participants (Independent t-test).

Variable	Hypertensive (n=160) Mean ± SD	Normotensive (n=640) Mean ± SD	p-value
Age (years)	27.10 ± 4.20	24.80 ± 3.80	<0.001
BMI (kg/m²)	27.50 ± 4.80	23.80 ± 3.90	<0.001

Hypertension was more prevalent in males (100/420; 23.81%) than females (60/380; 15.79%) (p=0.045), shown in Table 3. Prevalence increased with BMI: underweight 5.00%, normal 13.89%, overweight 25.00%, and obese 31.67% (p<0.001). Participants with a family history of hypertension had higher prevalence (80/280; 28.57%) compared to those without (80/520; 15.38%) (p<0.001). Hypertension was higher among smokers (31.25% vs. 17.19%; p=0.002), sedentary individuals (27.27% vs. 11.11%; p=0.018), alcohol users (25.00% vs. 19.44%; p=0.020), and those following an unhealthy diet (26.00% vs. 10.00%; p=0.010).

Table 3: Association of Hypertension with Categorical Variables (Chi-square Test).

Category	Subcategory	Hypertensive n (%)	Normotensive n (%)	p-value*
Gender	Male	100 (23.81)	320 (76.19)	0.045

	Female	60 (15.79)	320 (84.21)	
BMI Category (kg/m²)	Underweight (<18.5)	2 (5.00)	38 (95.00)	<0.001
	Normal (18.5–24.9)	50 (13.89)	310 (86.11)	
	Overweight (25–29.9)	70 (25.00)	210 (75.00)	
	Obese (≥30)	38 (31.67)	82 (68.33)	
Family History of Hypertension	Yes	80 (28.57)	200 (71.43)	<0.001
	No	80 (15.38)	440 (84.62)	
Smoking Status	Smoker	50 (31.25)	110 (68.75)	0.002
	Non-smoker	110 (17.19)	530 (82.81)	
Physical Activity	Active	40 (11.11)	320 (88.89)	0.018
	Sedentary	120 (27.27)	320 (72.73)	
Alcohol Use	Yes	20 (25.00)	60 (75.00)	0.020
	No	140 (19.44)	580 (80.56)	
Dietary Habits	Healthy diet	30 (10.00)	270 (90.00)	0.010
	Unhealthy diet	130 (26.00)	370 (74.00)	

Independent predictors of hypertension included increasing age (OR=1.05 per year; 95% CI: 1.02–1.08; p=0.001), male gender (OR=1.52; 95% CI: 1.05–2.20; p=0.028), higher BMI (OR=1.12 per unit; 95% CI: 1.07–1.17; p<0.001), family history of hypertension (OR=2.10; 95% CI: 1.44–3.07; p<0.001), smoking (OR=1.85; 95% CI: 1.20–2.85; p=0.005), sedentary lifestyle (OR=1.70; 95% CI: 1.15–2.52; p=0.008), and unhealthy diet (OR=1.80; 95% CI: 1.10–2.95; p=0.020). Alcohol use was not a significant predictor (OR=1.45; 95% CI: 0.85–2.47; p=0.176), shown in Table 4.

Table 4: Logistic Regression Analysis of Predictors of Hypertension

Variable	Adjusted OR (95% CI)	p-value
Age (per year increase)	1.05 (1.02–1.08)	0.001
Male Gender	1.52 (1.05–2.20)	0.028
BMI (per unit increase)	1.12 (1.07–1.17)	<0.001
Family History of Hypertension	2.10 (1.44–3.07)	<0.001
Smoking	1.85 (1.20–2.85)	0.005
Sedentary Lifestyle	1.70 (1.15–2.52)	0.008
Alcohol Use	1.45 (0.85–2.47)	0.176
Unhealthy Diet	1.80 (1.10–2.95)	0.020

Discussion

The total number of hypertension cases in this study was 20.00% (160/800) in young adults aged 18-35 years. This implies that there is a significant load of high blood pressure among a population that has historically been thought to be at lower risk. A community based study carried out in Pakistan recorded a relatively lower incidence of undiagnosed hypertension at 14.83% in a similar-aged category of 1835 years but this may be explained by the methodological differences present between the two studies like convenience sampling [12]. A cross sectional study on people aged 20-40 years in Pakistan reported an 18% prevalence which is very similar to our findings and highlights the increasing tendency of developing hypertension at the early stage of adulthood [13].

Our subgroup analysis showed that the mean age of the hypertensive group (27.10 ± 4.20 years) was more than the normotensives (24.80 ± 3.80 years) in the young adult range, which demonstrates the correlation between the age increase and the rise in blood pressure during young adulthood. This tendency is in agreement with the more general epidemiological trends of increasing blood pressure with age, even among younger groups

[14]. It is also representative of a worldwide trend which suggests that the initial signs of hypertension tend to signal clinical disease many years earlier, and regular screening of individuals below the age of 35 is necessary.

Hypertensive young adults tended to have significantly higher BMI (27.50 ± 4.80 kg/m 2 vs. 23.80 ± 3.90 kg/m 2, $p<0.001$), and the overweight/obesity categories were highly correlated with hypertension (e.g., obese 31.67% hypertensive). This is in agreement with the extant literature that associated high BMI with greater risk of hypertension because of the elevated sympathetic activity and metabolic abnormalities [15]. In addition, obesity is also reported to be a significant correlate of high blood pressure in the wider adult population in Pakistan, and the fact that adiposity is a modifiable risk factor in the younger population also supports the role of adiposity as a modifiable risk factor in the older population.

Sedentary behavior and smoking were other lifestyle factors that significantly predicted hypertension in our logistic model (sedentary lifestyle OR=1.70, smoking OR=1.85). These correlations are consistent with the results of a cross sectional study in Lahore, showing that smoking and physical inactivity independently correlated with hypertension at the same time considering age and BMI [16]. Other findings reported by us were that the prevalence among males (23.81%) was higher than female (15.79) which was statistically significant ($p=0.045$). Though there are studies that report no significant difference between genders among young adults, other studies, particularly meta analysis of Pakistani data indicate that hypertension burden in male population is slightly higher than in the female population in the overall adult population [17]. These patterns may reflect gender based differences in lifestyle exposures such as tobacco use and physical activity.

Lastly, the family history (OR=2.10) and unhealthy diet (OR=1.80) were found to be significant predictors of hypertension in our cohort. Past studies highlight family history as a predisposed risk factor of hypertension which may be an expression of combined genetic and environmental effects [18]. The observed dietary effect is in line with that of the rest of the world where high salt and processed foods are factors that have led to increased blood pressure even in the younger age groups.

Study Strengths and Limitations

The large sample size of 800 young adults in this study is an advantage as it represents the population well as it is stratified and random as the sample was taken among two major universities in Islamabad and there was a good representation of both genders and faculties. The reliability of the prevalence estimates was improved with standardized procedures of blood pressure measurement two times in one visit and two times in two visits. The multitude of lifestyle, demographic, and familial variables permitted a thorough examination of the predictors of hypertension by using chi-square tests and logistic regression analysis. Limitations, however, are the lack of causal inferences due to the cross-sectional approach, and a restriction to populations of universities, which could limit the extrapolation of the study to non-student young adults. Self-reported lifestyle factors such as diet, physical activity, and alcohol use could be prone to reporting bias. Also, the unmeasured variables such as stress levels, sleep habits and socioeconomic status might also contribute to the risk of hypertension but were not included in this study.

Conclusion

The research reveals that hypertension is present in 20.00% of the young adults in the university population, with more individuals being affected by it among males, older, with high BMI, sedentary, smoking, unhealthy eating habits, and positive family records. These results underscore the importance of early screening and preventive measures against the alterable risk factors among young adults. Regular screening, lifestyle changes and health education, including weight management, physical exercise, dietary changes, and smoking quit programs may help lessen the cardiovascular burden of early-onset hypertension among Pakistani youth.

References

1. Global Cardiovascular Risk Consortium. Global effect of modifiable risk factors on cardiovascular

disease and mortality. New England Journal of Medicine. 2023 Oct 5;389(14):1273-85. DOI: 10.1056/NEJMoa2206916

2. Poznyak AV, Sadykhov NK, Kartuesov AG, Borisov EE, Melnichenko AA, Grechko AV, Orekhov AN. Hypertension as a risk factor for atherosclerosis: Cardiovascular risk assessment. Frontiers in cardiovascular medicine. 2022 Aug 22;9:959285. https://doi.org/10.3389/fcvm.2022.959285
3. Zhang Y, Moran AE. Trends in the prevalence, awareness, treatment, and control of hypertension among young adults in the United States, 1999 to 2014. Hypertension. 2017 Oct;70(4):736-42. https://doi.org/10.1161/HYPERTENSIONAHA.117.09801
4. Mancia G, Kreutz R, Brunstrom M, Burnier M, Grassi G, Januszewicz A, Muiesan ML, Tsioufis K, Agabiti-Rosei E, Algharably EA, Azizi M. 2023 ESH Guidelines for the management of arterial hypertension The Task Force for the management of arterial hypertension of the European Society of Hypertension: Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). Journal of hypertension. 2023;41(12):1874-2071. https://iris.unibs.it/handle/11379/603005
5. Khoury M, Urbina EM. Hypertension in adolescents: diagnosis, treatment, and implications. The Lancet Child & Adolescent Health. 2021 May 1;5(5):357-66. https://doi.org/10.1016/S2352-4642(20)30344-8
6. Battistoni A, Canichella F, Pignatelli G, Ferrucci A, Tocci G, Volpe M. Hypertension in young people: epidemiology, diagnostic assessment and therapeutic approach. High Blood Pressure & Cardiovascular Prevention. 2015 Dec;22(4):381-8. https://doi.org/10.1007/s40292-015-0114-3
7. Wójcik M, Alvarez-Pitti J, Kozioł-Kozakowska A, Brzeziński M, Gabbianelli R, Herceg-Čavrak V, Wühl E, Lucas I, Radovanović D, Melk A, González Lopez-Valcarcel B. Psychosocial and environmental risk factors of obesity and hypertension in children and adolescents—a literature overview. Frontiers in cardiovascular medicine. 2023 Nov 20;10:1268364. https://doi.org/10.3389/fcvm.2023.1268364
8. Ojangba T, Boamah S, Miao Y, Guo X, Fen Y, Agboyibor C, Yuan J, Dong W. Comprehensive effects of lifestyle reform, adherence, and related factors on hypertension control: A review. The Journal of Clinical Hypertension. 2023 Jun;25(6):509-20. https://doi.org/10.1111/jch.14653
9. Charchar FJ, Prestes PR, Mills C, Ching SM, Neupane D, Marques FZ, Sharman JE, Vogt L, Burrell LM, Korostovtseva L, Zec M. Lifestyle management of hypertension: International Society of Hypertension position paper endorsed by the World Hypertension League and European Society of Hypertension. Journal of hypertension. 2024 Jan 1;42(1):23-49. DOI: 10.1097/HJH.0000000000003563
10. Higginbottom GM. Protocol for a qualitative study on promoting dietary change and positive food choices for poor people with low income who experience cardiovascular disease in Pakistan. http://dx.doi.org/10.1136/bmjopen-2013-004176
11. Schutte AE, Srinivasapura Venkateshmurthy N, Mohan S, Prabhakaran D. Hypertension in low-and middle-income countries. Circulation research. 2021 Apr 2;128(7):808-26. https://doi.org/10.1161/CIRCRESAHA.120.318729
12. Liaqat S, Afzal K, Ali A, Arif U, Parveen S. Prevalence of non-compliance to prescribed antihypertensive medication among hypertensive middle-aged adults at a tertiary care hospital, Faisalabad, Pakistan: a descriptive cross-sectional study. Journal of University Medical & Dental College. 2024 Nov 27;15(4):912-20. DOI: https://doi.org/10.37723/jumdc.v15i4.1048
13. Khan B, Memon NJ, Kalhoro MA, Shaikh M, Mehwish, Inayat D. Prevalence along with the risk factors of hypertension in young adults in the population under study: a cross-sectional study. J Popul Ther Clin Pharmacol. 2024;31(7):565-70 https://doi.org/10.53555/jptcp.v31i7.7020
14. Rapsomaniki E, Timmis A, George J, Pujades-Rodriguez M, Shah AD, Denaxas S, White IR, Caulfield MJ, Deanfield JE, Smeeth L, Williams B. Blood pressure and incidence of twelve cardiovascular diseases: lifetime risks, healthy life-years lost, and age-specific associations in 1· 25 million people. The Lancet. 2014 May 31;383(9932):1899-911. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(14)60685-1/fulltext#
15. Khan WB, Bhura SA. The association between age of onset of obesity and the rising risk of hypertension a cause of concern for young adults. JPMA. The Journal of the Pakistan Medical Association... 2024 Jul;74(7):1415. https://doi.org/10.47391/JPMA.11161

16. Zahid Z, Shah MA, Tanvir H, Amjad A, Asim F. Prevalence and associated factors of hypertension in young adults: A cross-sectional study. The Professional Medical Journal. 2024;31(01):44-8. https://doi.org/10.29309/TPMJ/2024.31.01.7839
17. Shah N, Shah Q, Shah AJ. The burden and high prevalence of hypertension in Pakistani adolescents: a meta-analysis of the published studies. Archives of public health. 2018 Apr 2;76(1):20. https://doi.org/10.1186/s13690-018-0265-5
18. Ranasinghe P, Cooray DN, Jayawardena R, Katulanda P. The influence of family history of hypertension on disease prevalence and associated metabolic risk factors among Sri Lankan adults. BMC public health. 2015 Jun 20;15(1):576. https://doi.org/10.1186/s12889-015-1927-7.