Regional Differences Among Cardiovascular Disease Risk Factors in Post-Communist Albania

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Abstract *This study examines the association between cardiovascular disease (CVD) and five modifiable risk factors (physical activity, smoking, blood cholesterol, blood pressure, and diabetes) associated with CVDs in two cities in post-communist Albania, a transitional country located in southeastern Europe. The study also hypothesizes an association between the lifestyle changes instigated by the political transition and the prevalence of these risk factors and CVD. The study cohort was comprised of 200 adults over the age of 38, with 100 participants for each city. Questionnaires, measuring quantitative variables for the five risk factors, along with anthropometric measurements were used for data collection. Findings revealed that participants from the southern city of Gjirokaster measured their blood cholesterol, blood pressure, and blood sugar levels more often and more regularly than northern participants from the city of Peshkopi. Additionally, southerners also displayed a greater certainty in family history of these risk factors and a lower prevalence of family history. A possible explanation for these results could be that a disparity in healthcare access may exist between the two regional cities. Data for the other risk factors, physical activity and smoking, showed similar trends reflected in previous studies, that participants in both cities exhibited a decrease in physical activity with time consumed 2-3 packs of tobacco daily. Based on these results, the study recommends the design and implementation of educational classes in these communities focused on cardiovascular disease and its associated risk factors in order to raise awareness and promote prevention of CVDs. Additionally, research efforts should be focused on verifying the hypothesis of unequal healthcare access regionally.*

Introduction

Cardiovascular disease (CVD) is the leading cause of mortality among Albanians, accounting for approximately 52% of the total number of deaths, a rate significantly higher than most western European nations (Hajidini, 2009). One of the main priorities of Albania's reform of the health care system is research on the diagnosis and prevention of cardiovascular diseases and associated risk factors. Previous research has shown that hypertension, obesity, physical inactivity, diabetes, and smoking are risk factors strongly correlated with the prevalence of cardiovascular disease (Kannel et al.1972; Savage 1998; Manson 1990; Hjerman et al. 1981). Further evidence by the Global Burden of Disease Study (2002) also emphasized the significant role these risk factors play in CVD globally. Hypertension reportedly caused half the CVDs worldwide; one third were due to hypercholestermia; physical inactivity, smoking, and unhealthy diet summed to a total of 20% of all CVD deaths globally.

For Albania, most of these risk factors are associated with socioeconomic and lifestyle changes instigated by the country's political transition in 1990 from a communist regime to a democratic government. Even following drastic political and economic changes, Albania's high life expectancy, in comparison to other eastern European nations, has not decreased. In fact, the prevalence of cardiovascular diseases has been and continues to be steadily increasing (Hajdini, 2009). Among the risk factors mentioned in the National Background Report on Health for Albania (2009), compiled by the Albanian Ministry of Health, are smoking, physical inactivity, and malnutrition linked to obesity. Of the three risk factors, smoking accounts for the greatest disease burden (about 22%). Obesity due to poor diet accounts for 10%, and physical inactivity for 5.3% of the disease burden. Seeing as they account for greater than one third of the total disease

burden (37%), measurement and prevention of these risk factors remains a critical goal of the Ministry of Health in Albania.

Few comprehensive studies have been conducted on the prevalence and risk factors associated with cardiovascular disease in Albania. Pre-existing data compiled during the communist era is scarce, and what little does exist is untrustworthy due to the discredibility of the communist regime (WHO 1999; Zickel 1994). In addition, the existing studies are limited in their scope of analysis of the risk factors and primarily focus on the more centralized cities, such as the capital Tirana.

Research on the prevalence of CVD was lacking for almost all northern and southern towns as no statistical data could be found in regards to regional rates of CVD prevalence. Although the highest rates of CVD and mortality were observed in urbanized central cities, such as Tirana, regionally, CVD was observed to be more prevalent in northern cities compared to southern (Gjonca et al., 1999). These differential rates could be accounted for by regional lifestyle differences, especially in daily physical activity level, nutritional diets, and tobacco usage. There were studies that acknowledge the regional differences in these CVD risk factors, but a comprehensive study assessment of all three risk factors (smoking, hypertension, and obesity), in addition to diabetes, in regards to CVD was lacking.

The purpose of this study was to gather comprehensive data on five modifiable risk factors associated with cardiovascular disease in the north and south for comparative analysis and future implementation of educational programs aimed towards reducing the growth of CVD in Albania.

Methods

Study Population

The study group comprised of 200 Albanian citizens, 100 from the northern city of Peshkopi and 100 from the southern city of Gjirokaster. In both cities, subject recruitment occurred in different wards of the community hospital, local clinics, and via door-to-door recruitment throughout neighborhoods. Participants had to be 38 years old or older in order to ensure that they were at least 18 years of age during the governmental transition in 1990. This age limit was chosen for the primary purpose of focusing on the health status of individuals from adulthood, or 18 years of age, and onward in life since the transition. Participants were informed about the study and its aims and procedures before agreeing by verbal consent to take part in the study.

Data Collection

In addition to a structured questionnaire, the study also measured anthropometric data. The questionnaire included socio-demographic factors, self-reported conditions, behavioral/life-style factors that are risk factors for cardiovascular disease, and self-perceptions of health status. Anthropometric data that was measured included height, weight, and blood pressure. Height was measured by a traditional tape measure in meters. Height measurements were converted into feet by a conversion factor of 3.3 feet per meter in order to calculate body mass index. Weight was measured on an electronic scale purchased in the U.S. Weight measurements were tabulated in pounds in order to calculate body mass index in lb/ft^2 (weight/height^2). A mechanical, wrist blood pressure monitor was used to measure blood pressure. Body mass index was calculated using the official BMI calculator from the National Heart, Lung, and Blood Institute website supported by the National Institutes of Health. The BMI categories were defined according to the following measurements: <18.5 for underweight; 18.5-24.9 for normal weight; 25-29.9 for overweight; and >30 for obese.

Family history of cardiovascular disease or of any of the five modifiable risk factors was tabulated if the subject had one or more first degree (i.e. siblings, parents) or second-degree relatives (i.e. aunts, cousins) with any of the conditions.

Statistical Analysis

Ninety-five percent confidence intervals (CI) and P values were calculated, with a p value of ≤0.05 to be considered statistically significant. χ^2 test was used to establish the relationships between pairs of categorical variables. T-test analysis was also performed for certain categorical data. All statistical analyses were performed on the program STATA 10.0.

Results

I. Sample Population Demographics

Demographic characteristics of all participants are presented in Table 1.

Table 1: Demographics

Variable	Peshkopi (n=100)		Gjirokaster (n=100)	
		95% CI		95% CI
Age (years, mean±SD)	52.0±11.26	49.8-54.1	53.7±11.63	50.8-55.1
Height (feet, mean±SD)	5.27±0.51	4.81-5.12	5.34±0.47	4.91-5.09
Weight (lbs, mean±SD)	167.8±24.9	162.2-171.7	164.3±32.22	157.6-170.3
Body mass index (lb/ft,mean±SD)	29.8±6.37	27.8-30.1	28.2±5.25	27.0-28.9
Body mass index ≥30 (lb/ft)	45%		32%	
Family history of CVD	45%		41%	

Mean ages of the participants were similar in both regions (mean age±SD in Peshkopi was 52.03±11.26 and in Gjirokaster 53.66±11.63). Southern participants were slightly taller and weighed less than northern participants. This resulted in a greater percentage of northern participants having a body mass index of 30 or greater, categorized as obese (45% in Peshkopi; 32% in Gjirokaster), even though the mean BMI for both cities was approximately equal. In addition to a greater obesity rate, Peshkopi also had a greater prevalence of family history of cardiovascular disease (45% in Peshkopi; 41% in Gjirokaster).

II. Smoking

Data on the measures of tobacco consumption is presented in Table 2.

Table 2: Measures of Tobacco Consumption

	Peshkopi	Gjirokaster	P-value
Past Status:			
Smoker	18	26	0.172
Non-smoker	82	74	
Age when started:			
<21	11	16	0.977
≥21	7	10	
Packs/day:			
<1	5	3	0.453
2-3	12	20	
2+	1	3	
Current Status:			
Still Smoke	8	15	0.387
Quit	10	11	
Comparative Consumption:			
More	2	2	0.89
Same	4	7	
Less	12	17	
Mate Status:			
Smoker	25	24	0.869
Non-smoker	75	76	
Packs/day:			
<1	1	5	0.144
2-3	24	19	
2+	1	1	
Status of Other Household Members:			
Smoker	19	24	0.333
Non-smoker	84	76	
Packs/day:			
<1	2	2	0.877
2-3	15	18	
2+	2	4	

There is a greater percentage of smokers in the south (26%) than in the north (18%). A greater percentage of those tobacco users also started at an earlier age in the south and smoked 2-3 packs per day on average. In the north, 10 of the 18 smokers had quit smoking. Fifteen of the 27 smokers in the south reported to continue smoking. There was no regional difference in the comparative consumption of tobacco, with both groups self-reporting a decrease in smoking since when they first started. A quarter of the participants in each city reported having a mate that smoked, with the majority of these being male. The consumption of the mates (2-3 packs daily) mirrored that of the participants. Twenty-

four percent of the participants in the south reported having another household member besides their spouse smoke in comparison to 19% of northerners. The consumption of the household members was similar to the consumption of the participants and their spouses', which were 2-3 packs on a daily basis.

III. Physical Activity

Data on the measures of daily physical activity is presented in Table 3.

Table 3: Measures of Physical Activity

	Peshkopi	Gjirokaster	P-value
Current Status:			
Physically Active	97	100	0.308
Days/Week:			
<7	3	1	0.312
7	97	99	
Hours/Day:			
<2	4	13	0.061
2-5	14	10	
5-8	24	16	
8+	53	60	
Type of Activity:			
Housework; Walking; Standing	X		
Agricultural Work; Walking		X	
Comparative Activity:			
More	21	20	0.947
Same	30	30	
Less	47	50	

Almost all participants in both regions of the country (97% in the north; 99% in the south) self-reported to be physically active seven days a week. Fifty-three percent of northerners reported to be engaging in physical activity, such as housework, walking, and standing, for more than 8 hours on a daily basis. Sixty percent of southerners reported to be physically active for greater than 8 hours daily, engaging in such activity as agricultural work and walking, predominantly. Both regions exhibited equal rates of comparative activity, with the majority reporting to engage in a decreased amount of physical activity in comparison to previous years.

IV. Blood Cholesterol

Data on the measures of blood cholesterol is presented in Table 4.

Table 4: Measures of Blood Cholesterol

	Peshkopi	Gjirokaster	P-value
Measurements:			
Regularly	46	62	0.039
Never	53	37	
Uncertain	1	1	
Periodicity:			
Rarely, whenever feeling unwell	27	13	<0.001
Monthly	4	6	
3 Months	2	16	
6 Months	7	11	
Yearly	6	16	
On Statins:			
Yes	22	19	0.419
No	71	80	
Uncertain	3	1	
Family Hx of Hypercholesteremia:			
Yes	30	23	0.05
No	35	52	
Uncertain	35	25	
Perception of Blood Cholesterol Levels:			
Normal	53	55	0.338
High	17	23	
Uncertain	30	22	

Sixty-two percent of southern participants reported on having regular blood cholesterol measurements, defined to be at least once a year, in comparison to 46% in northerners. Of the 62%, the majority reported on taking tri-monthly or annual measurements, while of the 46% in the north, the majority reported on taking measurements rarely, defined to be in instances when they felt unwell. Eighty percent of Gjirokaster participants and 71% of Peshkopi participants reported to not be on statins. There was found to be a 10% difference in self-reported uncertainty in family history of high blood cholesterol. A greater percentage of southern residents (52%) admitted to having no prior family history of hypercholesterolemia in comparison to 35% in northerners. In terms of self-perception of cholesterol levels, greater than half of participants in both cities perceived themselves to have normal levels. Almost half of the remaining 50% of the participants reported uncertainty in self-perceptions due to lack of knowledge of cholesterol.

V. Blood Pressure

Data on the measures of blood pressure is presented in Table 5.

Table 5: Measures of Blood Pressure

	Peshkopi	Gjirokaster	P-value
Measurements:			
Regularly	80	91	0.027
Never	20	8	
Uncertain	1	1	
Periodicity:			
Rarely, whenever feeling unwell	28	45	<0.001
Daily	10	26	
Weekly	14	18	
Monthly	24	8	
3-6 Months	4	3	
On Hypertensives:			
Yes	31	43	0.204
No	66	57	
Uncertain	3	1	
Family Hx of Hypertension:			
Yes	66	52	0.042
No	26	43	
Uncertain	8	5	
Perception of Blood Pressure Level:			
Normal	65	60	0.749
High	32	36	
Uncertain	3	4	

A greater percentage of southerners measured their blood pressure regularly, defined to be at least once a year, compared to northerners (91% to 80%, respectively). The majority of the 80% reported to measure it either on a monthly basis or whenever they were feeling unwell. While the majority of the 91% reported to measure it rarely in instances when they felt unwell. Approximately one third of northerners were on statins compared to 40% in the south. Although more than half of northerners and southerners each had family history of high blood pressure (61% to 52%, respectively), more than half of those same participants perceived to have normal blood pressure levels (65% to 60%, respectively).

VI. Diabetes

Data on the measures of blood sugar is presented in Table 6.

Table 6: Measures of Hyperglycemia

	Peshkopi	Gjirokaster	P-value
Measurements:			
Regularly	40	67	<0.001
Never	60	33	
Uncertain	1	1	
Periodicity:			
Rarely, whenever feeling unwell	22	23	0.05
Weekly	1	5	
Monthly	2	8	
3-6 Months	6	22	
Yearly	9	9	
On Antidiabetics:			
Yes	8	13	0.393
No	79	87	
Uncertain	3	1	
Family Hx of Hyperglycemia:			
Yes	26	22	0.005
No	59	75	
Uncertain	15	3	
Perception of Blood Sugar Level:			
Normal	81	79	0.599
High	8	12	
Uncertain	11	9	

There was a difference of more than 20% between northerners and southerners in blood sugar measurements, with 40% of northerners versus 67% of southerners measuring blood sugar regularly. Of those that measured blood sugar regularly, the majority of the 40% of northerners measured it only when they were feeling unwell while southerners also reported on measuring it every three to six months in addition to instances when they were feeling unwell. Seventy-nine percent of Gjirokaster participants and 87% of Peshkopi participants were not on diabetes medications. There was a vast difference in the percentage of participants that reported to not have family history of diabetes, with a greater percentage in the south (75% to 59%, respectively). A greater percentage in the north was unsure of any family history of hyperglycemia. Almost 80% of both groups perceived to have normal levels of blood sugar (81 to 79%, respectively).

Discussion

Our primary focus will be on discussing the statistically significant data, defined to be with a p value of less than or equal to 0.05. Across three of the five risk factors, cholesterol, blood pressure, and diabetes, three variables were statistically significant: 1) how often participants measured those risk factors; 2) the periodicity of the measurements; and 3) self-reporting of any prior family history of the associated risk factors.

I. Blood Cholesterol

Gjirokaster participants take regular measurements more often than those in Peshkopi (62% to 46%, respectively, p-value of 0.039). Additionally, southern participants take more frequent measurements on a monthly or tri-monthly schedule as opposed to northern participants (16% to 2%, respectively, with a p value of less than 0.001). The majority of northerners reported measuring cholesterol rarely, for example, only when they were feeling unwell. In terms of family history, a greater percentage of Gjirokaster participants have no prior family history of high cholesterol (52% to 35%, respectively, with a p value of 0.05) and a lower percentage of them were uncertain. On the contrary, a greater percentage of northern participants reported uncertainty in family history (35% to 25% respectively) and a greater percentage of having family history (30% and 23%, respectively, with p value of 0.05).

II. Blood Pressure

Similarly, southern participants had a higher rate of taking regular measurements of their blood pressure in comparison to northern participants (91% to 80%, respectively, with p value of 0.027). Although both regional groups had a high rate of taking blood pressure measurements in rare instances of poor health, there were still a greater percentage of participants that reported taking daily measurements in the south than in the north (26% to 10% respectively, with a p value of <0.001). Additionally, a greater percentage of Gjirokaster participants reported no family history of high cholesterol (43% to 26%, respectively, with a p value of 0.042) and a lower percentage of them were uncertain about their family history (5% compared to 8%, respectively). On the contrary, a greater percentage of northern participants reported uncertainty in family history and a greater percentage of having family history (66% to 52%).

III. Blood Sugar

Southern participants had a higher rate of taking regular measurements of their blood sugar in comparison to northern participants (67% to 40%, respectively, with p value of less than 0.001). Both regional groups presented with a high rate of taking blood sugar measurements in rare instances of poor health, yet we still observed an equally high percentage of participants that reported taking tri-monthly measurements in the south than in the north (22% versus 6% respectively with a p value of 0.05). This mirrors the same trend with the other two risk factors; northerners have a less frequent periodicity of measurements. Also, a greater percentage of Gjirokaster participants report no family history of high cholesterol (79% to 81% respectively with p value of 0.005) and a lower percentage of them were uncertain (3% to 15% respectively). Again, this is the same trend seen in the other two risk factors of the South have a lower degree of family history of risk factors and greater certainty in family history. On the contrary, a greater percentage of northern participants reported uncertainty in family history and a greater percentage of having family history.

III. Conclusions

The trends are similar for all three variables deemed statistically significant (measurements, periodicity, and family history) of all three risk factors (cholesterol, blood pressure, and diabetes). Southern participants reported more frequent measurements at a greater periodicity in addition to a greater certainty in and lower percentage of family history. According to the data, southerners are more knowledgeable about their health and the health history of their families due to more frequent check-ups and follow-ups with healthcare providers. This knowledge suggests regional disparities in healthcare access that may be contributing to the inequality in access.

One of the reasons for the health inequality in Albania could be due to the unequal distribution of general practitioners throughout Albania. Theodorakis et al. (2006) examined the availability of primary care medical resources and the associated distribution of general practitioners (GP) from 2000-2004. Although the four-year period saw an increase in the number of GPs within the country from 1,531 in 2000 to 1,579 in 2004, this did not translate into a more equal regional distribution of those additional GPs. In a supporting study, the same researchers showed the unequal distribution of primary care physicians specifically for the region of Gjirokaster (Theodorakis et al., 2005). Similar studies examining this trend in resources and associated GP distribution have been conducted in developed countries also, such as Sweden, Japan, US, and UK, and all have shown the same general trend of a misdistribution of GPs even with an increasing supply of physicians (Mantzavinis et al. 2003; Koayashi et al. 1992; Horev et al. 2004; Hann et al. 2004).

A huge emphasis of the Albanian healthcare reform movement has been placed on the role of primary care and increasing healthcare access across the country (Nuri et al., 2002). Clearly, the disparities among northerners and southerners in check-ups present the need for greater efforts in terms of policy changes that need to be made in ensuring a decrease in health inequality.

Family history is of significant importance as one of these risk factors since previous research has shown that family history is strongly correlated with increased likelihood of cardiovascular diseases. Roshi et al. (2005) showed a positive relationship between family history of coronary heart disease and myocardial infarction. Burazerl et al. (2007) performed a similar study on Albanian residents in the capital city of Tirana to assess the association of the same risk factors assessed in our study and their association with acute coronary syndrome, a specific type of cardiovascular disease. This study observed an even stronger association between family history of heart disease and acute coronary syndrome. More importantly, the increased likelihood of heart disease was not solely due to genetics but to the adoption of new lifestyles that promoted poor health habits that instigated heart disease. This highlights the need for educational programs in order

to raise awareness and prevention of these risk factors and cardiovascular diseases in general. Through adequate education and increased health awareness, Albanians can become more involved in the status of their wellbeing.

Data collected for the other variables and risk factors did not come out to be as statistically significant. These results could be attributed to various limitations, including small sample size; a social desirability factor that could lead to falsely self-reported measures in order to fit into a preferred social category; lack of educational health knowledge by the participants; and incorrect recall memory of how often they checked their blood chemistry. Additionally, this is a cross-sectional study, which limits the establishment of a causal relationship among the risk factors and CVD. We hope to continue this data collection in establishing a longitudinal study data set to allow for a stronger significance and causal relationship among all variables and risk factors associated with cardiovascular disease.

Smoking is and always has been an important aspect of Albanian culture during and post-communism and other studies have reflected similar results observed in our study. The prevalence of tobacco use increased with the political transition (Ross et al., 2008). Consumption of tobacco from 1980 to 1999 increased from 786 cigarettes per person per year to 963 cigarettes per person per year. This increase represents a reported 22.5% increase in cigarette consumption since the communist rule until 8 years post-communism (United Nations, 2002). As the tobacco industry became more lenient, tobacco smuggling from overseas became a common practice, which also contributed to the increased smoking rates. Now, not only was Albania devoting a greater proportion of its agricultural land to tobacco, from 3.2% in 1970 to 4.8% in 1992, but additional sources of cigarettes were also available through imports. Tobacco advertising also emerged, which was previously unknown (Shapo et al., 2003).

Unfortunately, the mortality rate due to smoking, including second-hand exposure, has also seen a dramatic increase, claiming the lives of approximately 3,800 Albanians annually. Ross et al. (2008) highlights findings on smoking prevalence in Albania through data gathered by the Albanian Adult Tobacco Survey (AATS) in 2007. Results suggested that smoking is a huge problem among men and women as the rate continues to increase ever since the fall of the communist government. Prevalence of smoking among men (64%) was significantly greater than that of women (17%). Although the smoking prevalence among women is relatively low in comparison to men, it still presents itself as a significant problem as the rate among women has nearly doubled since 1990 and continues on this upward trajectory. Our data suggests that the majority of participants who identified themselves as current smokers smoke 2-3 packs on a daily basis (12% in Peshkopi and 20% in Gjirokaster). This mirrors the results observed in the AATS, where 85% of participants who were current smokers reported smoking on a daily basis and with a high intensity. Smoking is a risk factor for many diseases, thus high tobacco consumption leads to an increased risk of mortality from these smoking-related diseases in the long run. These results emphasize the need for smoking cessation programs and curbing of tobacco consumption through policy changes.

The prevalence of physical inactivity is also more widespread in transitional Albania with the emergence of new lifestyles. The increasing rate of sedentary lifestyles reached levels of 49% in men and 58% in women in 2001. This increase contributed to the increase in body mass index, which was found to be associated with a greater chance of coronary disease in the Burazeri et al. (2007) study performed the study on a cohort of citizens in Tirana. The odds ratio for men and women for BMI greater than 25, which is considered overweight, was 1.23 and 2.74; for BMI of greater than 30, which is considered obese, the odds ratios were 1.57 and 4.48, respectively. Obesity is seen as a major health problem in the coming future as it continues to sharply rise. Almost all participants in both regional cities reported to be physically active for at least eight hours a day. The predominant activity most were engaged in was minimally physically exertive housework or walking/standing. More importantly, almost half of participants in each city (47% in Peshkopi and 50% in Gjirokaster) admitted to being engaged in less physical activity compared to previous years.

The poor health habits and conventional risk factors specified in this study are important indicators of heart disease. More importantly, they are modifiable. Oei et al. (2005) performed a an observational study, consisting of three trials spanning of 5-7 years to estimate what effect, if any, a decrease in smoking, blood pressure, and blood cholesterol would have on a specific type of CVD, coronary heart disease (CHD), risk. Their findings indicated a greater decrease in CHD risk with decreased smoking and cholesterol levels in comparison to taking medicinal therapy and continuing to engage in unhealthy behaviors. A 48% decreased risk of CHD was observed in men and a 42% decrease in women. Studies such as this one reinforce the immediate need for implementation of health programs directed at lowering cardiovascular disease risk factors by educating the public and raising awareness. The effectiveness of such disease management programs has been empirically shown to be efficacious in lowering CVD risk factors and improving outcomes (Gravely et al., 2012).

In conclusion, our findings highlight the prevalence of cardiovascular disease risk factors in two regions of the former communist country of Albania. The trends of these risk factors (smoking, physical activity, cholesterol, blood pressure, and diabetes) supports previous research findings on these same risk factors in Albania. Our study further showed that

these two regions engaged in similar health behaviors but exhibited geographic variation in the receiving of healthcare. Further research is required to: 1) expand the study population size 2) design and implement regionally appropriate educational programs to raise awareness and prevention of CVDs and associated risk factors and 3) to investigate potential regional differences in healthcare access.

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