**PUBLIC HEALTH ANF REFORMS CENTER
OF MINISTRY OF HEALTH
OF AZERBAIJAN REPUBLIC**

**with support of
WORLD HEALTH ORGANIZATION**

**STUDY OF TRENDS IN THE PREVALENCE OF CERTAIN
NCD RISK FACTORS
AMONG WOMEN IN AZERBAIJAN**

FINAL REPORT

BAKU, 2015

This study was conducted by Public Health and Reforms Center (PHRC) of Ministry of Health of Azerbaijan Republic in 2014-2015 with technical support of World Health Organization.

Project coordinator: **Tohfa Jamilova, PHRC**

Report developed by: **Tohfa Jamilova, PHRC**

Other contributors: **Lutfi Gafarov, PHRC**
                                     Gahraman Hagverdiyev, PHRC

TABLE OF CONTENTS

INTRODUCTION

With the epidemiologic transition the main burden of diseases shifted from infectious diseases to chronic noncommunicable diseases (NCDs), which have become a major challenge to global development now. The recent Global Burden of Disease Study 2010 (GBD 2010) found that in 2010, 54% of all global DALYs were due to NCDs, compared with 35% due to communicable, maternal, neonatal and nutritional disorders, and 11% due to injuries [1]. With declining fertility rates and improvement in health care in many low- and middle-income countries, the global burden of NCDs is predicted to catch up with the European pattern in the near future.

Among other conditions, chronic noncommunicable diseases include circulatory diseases, chronic respiratory diseases, cancer and diabetes. Most of these diseases are attributed to common behavioral risk factors such as tobacco use, excessive alcohol consumption, unhealthy nutrition, and physical inactivity. Other group of risk factors is so called biological risk factors such as overweight or obesity, high blood pressure, high blood glucose and high blood lipids.

According WHO data [2] overall, the three risk factors that account for the most disease burden in Azerbaijan are dietary risks, high blood pressure, and high body-mass index.

Obesity is one of the greatest public health challenges of the 21st century. Overweight and obesity are risk factors of a number of medical conditions including diabetes, heart disease and stroke. They are characterized by abnormal or excessive fat accumulation and determined by body mass index value (BMI). According to results of National Survey of risk factors for chronic noncommunicable diseases in Azerbaijan (2011) [3] the mean body mass index (BMI) was 27.0 with women having higher BMI than men (27.6 vs. 26.5 respectively). The proportion of the respondents classified as overweight and obese was 35.8% and 21.9% respectively. The obesity was substantially more prevalent among women than men (27.2% vs. 16.4%).

According to survey data the other widely spread risk factor in Azerbaijan is high blood pressure. This is one of the most important modifiable risk factors for cardiovascular diseases such as heart attack, myocardial infarction, acute coronary syndrome, congestive heart failure, strokes, kidney disease, and peripheral vascular disease. Overall, 872 out of 2000 respondents had raised blood pressure or were taking medicines for hypertension. Of them, 7.5% were on medication and had their blood pressure controlled, 34.6% were taking drugs for raised blood pressure but did not have it controlled, and, finally, 57.9% were not taking any anti-hypertensive medicines and did not have their blood pressure under control. Around half of women were on medication, whereas only slightly about the third of men were on treatment.

Taking into account prevalence and rising input of these risk factors on burden of diseases in the country there is need to analyze their national and regional level trends and associations between these risk factors and other factors of women health and behavior.

DATA AND METHODS

Objective

This study examined the trends in the prevalence of certain risk factors of NCDs (overweight and high blood pressure) for the period from 2006 to 2011, and association of these trends with socio-demographic characteristics of women, as well as with socio-economic development of the country and ongoing reforms in the health system of Azerbaijan.

Data sources

The analysis is based on the data from Azerbaijan Demographic and Health Surveys 2006 and 2011 [4,5]. AzDHS 2006 collected information from 7619 sample households while DHS 2011 collected information from 7704 household over the country. The sampling design for both surveys was developed by the State Statistical Committee of Azerbaijan Republic. The basis of sample consisted of the counting points (enumeration units) created for the Census-1999 and Census-2009 correspondingly. A representative probability two-stage cluster sampling design was used for both surveys. The surveys cover the following regions of the Republic of Azerbaijan:

- Baku
- Absheron
- Ganja-Gazakh
- Shaki-Zagatala
- Lankaran
- Guba-Khachmaz
- Aran
- Yukhari Garabakh (Aghdam, Fuzuli and Tartar)
- Daghligh Shirvan

All women age 15-49 years in selected households were eligible for interview. As result databases included nationally representative samples of 8652 women and 9804 women age 15-49 correspondingly. Individual questionnaires were completed for 97.6% of eligible women in 2006 and 95.7% of eligible women in 2011. More details on the sample design are provided in the main survey reports.

The surveys measured such key biomarkers as height, weight and blood pressure of respondents and included questions on dietary habits, hypertension and diabetes history, which are analyzed in this report as well.

Measurements of obesity and hypertension.

All survey respondents were weighed using a solar-powered scale with an accuracy of ±100 g. Their height was measured using an stadiometer for adults in a vertical position. The weight and height data were used to calculate the body mass index (BMI). BMI was used to define underweight (BMI < 18.5 kg/m2), normal (BMI 18.5-25.0 kg/m2), overweight (25.0 ≤ BMI <30.0 kg/m2) and obese (BMI ≥ 30 kg/m2) women. Blood pressure measurements were taken by female interviewers who were nurses and doctors. Measurements were made

using electronic tonometer (Riester Model richampion, digital upper-arm measuring device, fully automatic, 1 tube, No.1715). Before the survey fieldwork, these interviewers were given refresher training in measurement procedures in nonclinical settings according to the manufacturer's recommended protocol. Three measurements of systolic and diastolic blood pressure (measured in millimeters of mercury, mmHg) were taken during an interview, with an interval of at least 10 minutes between measurements and results were recorded in an individual questionnaire. The mean of three measurement was calculated and recorded in the appropriate box. Women were classified as hypertensive if they were taking antihypertensive drugs, or if (according to the mean value) their systolic blood pressure exceeded 140 mmHg or their diastolic blood pressure exceeded 90 mmHg. elevated blood pressure was classified as mild, moderate or severe according to the cut-off points recommended by the U.S. National Institutes of Health (1997):

Level of hypertension	Systolic	Diastolic
Stage 1, mildly elevated	140-159	90-99
Stage 2, moderately elevated	160-179	100-109
Stage 3, severely elevated	180+	110+

Analysis

Data are analyzed using both descriptive and correlation methods. Women who were pregnant at the time of the survey were excluded from the analysis. All figures were estimated using the SPSS statistical software package. The following background characteristics of women respondents were included as controls in the multivariate models: age, marital status, education, wealth, urban/rural residence and geographic region (see table 1). Results are presented in the form of percentages, coefficients, relative risks with significance levels and 95% confidence intervals (95% CI).

Table 1. Background characteristics of women respondents, % (AzDHS 2006 and DHS 2011).

| Background characteristics	Az DHS 2006	DHS 2011
Age		
15-19	18.1	17.6
20-24	15.9	20.7
25-29	13.0	13.9
30-34	11.9	10.2
35-39	13.7	9.5
40-44	15.6	13.1
45-49	11.6	15
Marital status		
Never Married	30.9	34.8
Married/living together	62.2	58.3
Separated/divorced/widowed	4.0	3.9
Education		
Basic secondary or less	21.5	20.3
Complete secondary	51.9	47.3
Secondary specialized	13.5	17.8
Higher	13.1	14.6
Residence		
Rural	43.5	39.8
Urban	56.5	60.2
Region		
Baku	30.3	28.4
Absheron	6.9	7.4
Ganja-Gazakh	13.6	13.8
Shaki-Zagatala	7.0	7.0
Lankaran	8.4	9.0
Quba-Khachmaz	4.5	5.9
Aran	23.9	22.6
Yuxari Garabakh	2.4	2.9
Daghligh Shirvan	3.0	3.1
Wealth		
Lowest	18.4	18.0
Second	19.5	19.0
Middle	20.2	19.5
Fourth	20.4	21.0
Highest	21.5	22.5

Human subjects informed consent

Analysis presented in this paper is based on an analysis of existing survey data with all identifier information removed. Informed consent was obtained from all respondents in the survey before asking questions and separately before obtaining measurements of height and weight and blood pressure.

RESULTS

HYPERTENSION

According to DHS-2011 in Azerbaijan women (age 15-49) are almost evenly distributed among age groups with slight pick at younger groups (15-19 and 20-24). More than half of women (58.3%) are married or living together with partner, while 34.8% (mainly young women) never have been married. Approximately the same demographic situation was observed in 2006. More than half of women are urban residents (in 2006 -56.5%. in 2011 - 60.2%). Proportional to the size of regions most of women live in Baku. Aran and Ganja-Gazakh economic regions.

Diagram 1. Distribution of women population of reproductive age in Azerbaijan according to AzDHS 2006 and DHS 2011.
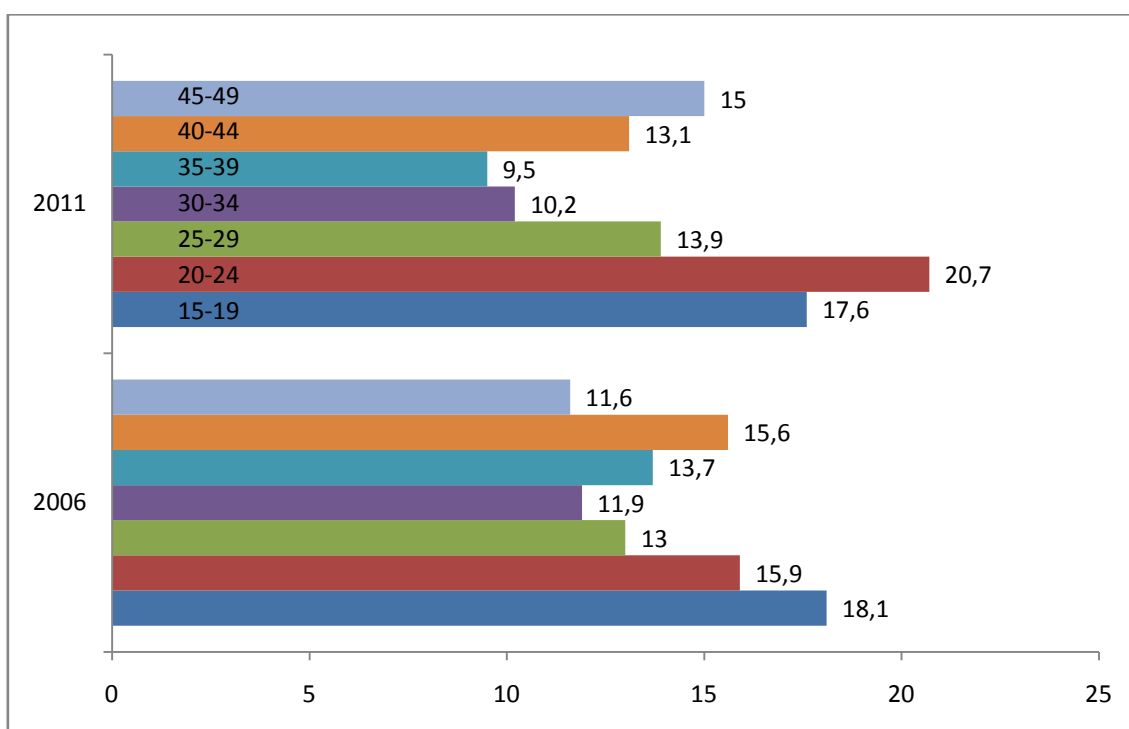
While analyzing blood pressure levels across different age groups. regions and urban/rural residents some interesting results were obtained.

According to DHS2011 data mean systolic blood pressure of all women respondents whose blood pressure was measured was equal to 116.9 mmHg. median was equal to 115 mmHg. As it is seen from diagram 2 the distribution of systolic blood pressure scores is almost normal (with little right skew) which is confirmed by mean being almost similar to median. Mean diastolic blood pressure was equal to 75.8 mmHg.

Diagram 2. Systolic blood pressure distribution.
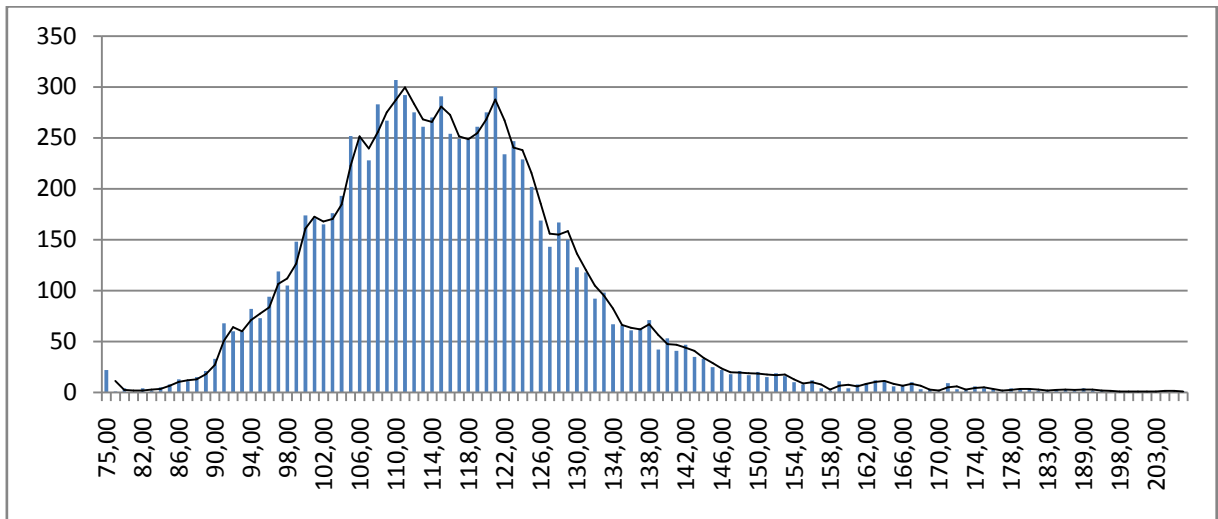
As it was expected. analysis of mean systolic and diastolic blood pressure by age groups showed significant correlation of blood pressure levels with age of respondents. Trends of systolic and diastolic blood pressure by age groups are shown in diagrams 3 and 4.

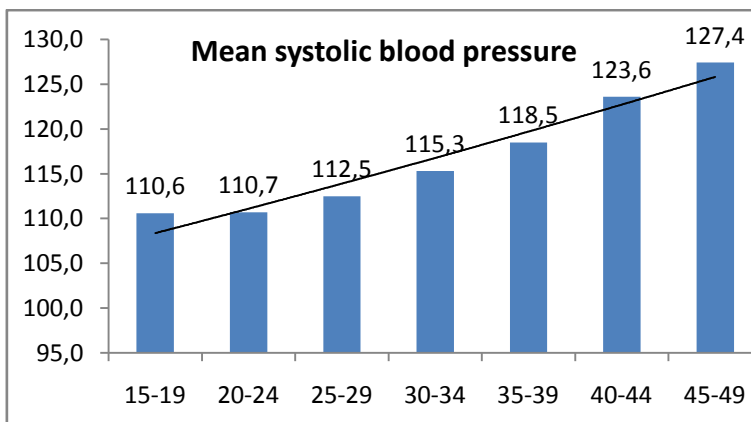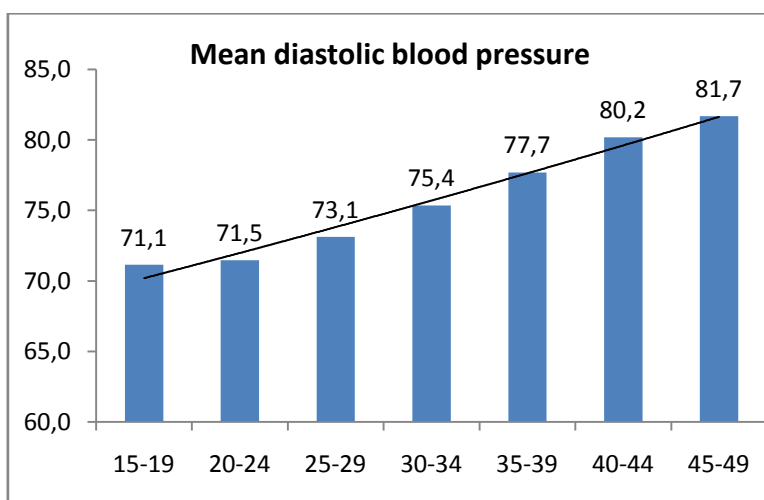**Diagram 3. Mean systolic blood pressure by age groups (DHS-2011)**

Diagram 4. Mean diastolic blood pressure by age groups (DHS-2011)

Mean diastolic blood pressure

Coefficient of correlation of blood pressure by age groups was 0.341 and 0.391 respectively for 2006 and 2011, which indicates moderate correlation between these two parameters. Therefore increase in prevalence of hypertension by age groups (see Table 2) in both surveys is considered to be significant.

Table 2. Prevalence of hypertension by age groups in 2006 and 2011.

Age	Prevalence of hypertension (%)	
	2006	2011
15-19	3.0	2.8
20-24	6.4	3.4
25-29	10.7	6.0
30-34	15.6	9.3
35-39	21.0	16.9
40-44	28.7	24.9
45-49	36.0	34.1
Total	16.4	13.0

Table 3. Prevalence of hypertension by residence, regions, education and wealth

Background characteristics	Prevalence of hypertension (%)	
	2006	2011
Residence		
Urban	14.9	12.3
Rural	18.2	13.9
Region		
Baku	14.5	12.3
Absheron	11	8.4
Ganja-Gazakh	19.7	12.3
Shaki-Zaqatala	13.5	12.6
Lankaran	24.6	15.8
Guba-Khachmaz	13.3	10.3
Aran	17	15.1
Yukhari Garabakh	16	10.9

Daghligh Shirvan	15.5	16
Education		
Basic secondary or less	14.2	11.7
Complete secondary	17.3	14
Secondary specialized	17.6	13.7
Higher	15.0	10.5
Wealth quintile		
Lowest	19	14.8
Second	17.9	14.1
Middle	17.3	12.2
Fourth	15.2	12.4
Highest	13	11.5
Total	16.4	13

While analyzing total prevalence of hypertension among women age 15-49 in the country significant decrease was discovered in this indicator from 2006 to 2011 (see Table 3). Prevalence of hypertension has decreased from 16.4% in 2006 (with 95% CI from 15.1% to 17.5%) to 13% in 2011 (with 95% CI from 12.1% to 13.8%).

In 2006 relative risk of having hypertension was by 22% higher in rural areas than in urban. In 2011 it was higher in rural areas only by 13%. It is an interesting finding and shows that during 5 year period from 2006 to 2011 decrease in hypertension prevalence in rural areas was more noticeable than in urban. It can be explained by optimization of the network of health facilities in the country with special focus on rural areas, implementation of family medicine and introduction of family doctors in rural areas, as well as by reequipment of rural health facilities.

Analysis of links between blood pressure levels and education levels or wealth has not found any statistically significant linkages.

In 2006 the highest levels of hypertension were observed in Lankaran, Ganja-Gazakh and Aran regions. In 2011 Lankaran and Aran remained in this top list joined by Dagligh Shirvan region while prevalence of hypertension in Ganja-Gazakh region decreased by 7.4% and this region dropped from top 3 list.

The most noticeable decrease was observed in three regions: Lankaran (from 24.6% to 15.8%). Ganja-Gazakh (from 19.7% to 12.3%) and Yukhari Garabakh (from 16% to 10.9%). The scale of reduction was rising with level of education: for basic secondary or less education relative reduction of hypertension prevalence was by 2.5%, for complete secondary - by 3.3%, for secondary specialized - by 3.9%, for higher education - by 4.5%, among wealth quintiles the most noticeable decrease on hypertension prevalence was observed in middle one (from 17.3% to 12.2%).

Besides measuring women's blood pressure they were asked several questions regarding hypertension history: have they ever their blood pressure measured and by whom, have they been ever told by health professional that they have hypertension, have they received any recommendations in case of having hypertension, and what kind of recommendations did they receive (see Table 4).

Table 4. History of hypertension (%)

History of hypertension	2006	2011
Ever told by health professional that have high blood pressure or hypertension	9.2 (776 respondents)	6.9 (676 respondents)
Told that have hypertension on two different visits	81.9 (640 out of 776)	82.1 (557 out of 676)
Were told what to do about hypertension	82.5	82.4

9.2% of respondents 2006 have been told by a health professional that they have high blood pressure or hypertension. In 2011 their proportion was 6.9%. This reduction also confirms decrease in hypertension prevalence discovered by respondents' blood pressure measurements.

Analysis of data within the regions revealed that in 2006 diagnosis of hypertension prevailed among respondents from Lankaran, Absheron and Ganja-Gazakh regions while in 2011 this in indicators in above regions decreased noticeably. Consequently prevalence of hypertension diagnosis became relatively higher in Daghligh Shirvan, Yukhari Garabakh and Aran regions

Most of these women were told to have raised blood pressure of hypertension in two different visits. However not all of them received recommendations on what to do about hypertension. In both surveys only 82% of people who were told to have hypertension were also told what to do about it.

According to DHS 2011 women who were told by physician that they had hypertension but weren't provided with any advice on what to do (120 out of 676) were mainly never married (27%) rural residents (20.6%) of age 15-24 (35.2%) from Guba-Khachmaz region (25%) and Daghligh Shirvan (23.1%) with basic secondary or less education (23.9%). In AzDHS 2006 the picture was slightly different(136 women out of 776 didn't received any recommendation): mainly never married (40.2%) urban residents (19.1%) of age 15-24 (36.8%) from Absheron (44.2%) and Lankaran region (20%) with basic secondary or less education(37.6%).

All this data shows worse situation with hypertension in definite regions in 2006 (Absheron and Lankaran) and weaker response from health system and healthcare providers to this issue. In 2011 situation in these regions became better which can be explained by introduction of new and strengthening of existing health care facilities, mobilization and training of personnel and implementation of different health projects as result of bigger attention from health system managers to these regions. For example, one of indicators shows that in 2006 in Absheron number of doctors per 10 thousands of population was 127, in 2011 this figure reached 197 [6].

Consequently, relatively worse situation in some other regions (Daghligh Shirvan, Yukhari Garabakh) entered the agenda.

Another interesting analysis was made: women who ever have been or haven't been told to have hypertension were divided by level of blood pressure at the moment of survey (see Tables 5.1 and 5.2).

It was discovered that about 17-20% who have ever been told to have raised blood pressure had normal blood pressure at the moment of surveys, which can be explained in two ways - false positive diagnosis for women with normal blood pressure or appropriate prevention of hypertension among women who ever had elevated blood pressure. At the same time 8-10% of women whose blood pressure measurements at the moment of surveys have shown hypertension have never been told by health professionals to have this problem. These women can be considered as not diagnosed by health care providers at primary health care level.

Table 5.1. Blood pressure level and hypertension history (2006)

Ever told by health professional that respondent has high blood pressure or hypertension	Normal BP	High BP (or normal BP and takes medicines)	Total
Yes	17.1	82.9	100.0
No	89.3	10.7	100.0
Don't know	87.6	12.4	100.0

Table 5.2. Blood pressure level and hypertension history (2011)

Ever told by health professional that respondent has high blood pressure or hypertension	Normal BP	High BP (or normal BP and takes medicines)	Total
Yes	20.4%	79.6%	100.0
No	92.0%	8.0%	100.0
Don't know	91.3	8.7	100.0

82.9% of those who have ever been told by health care provider that they have hypertension had raised blood pressure at the moment of the survey in 2011.

Table 6. Recommendations for respondents who received any advice on what to do with hypertension (%)

Recommendations	2006	2011
Taking medicine	93.4	93.2
Control weight	37.1	43.4
Cut down salt	57.5	56.6
Exercise	22.6	21.0
Cut down alcohol	5.9	5.4
Stop smoking	6.3	3.6

Recommendation for respondents with diagnosis of hypertension include medicine prescription and prevention efforts such as recommendation to control weight, cut down salt, do more exercise, cut down alcohol and stop smoking.

As it is seen form Table 6 in most cases there have been no significant changes in health professionals' recommendations patterns between 2006 and 2011. It is interesting that while recommendations on weight control have increased by approximately 6%, advice on stop smoking has decreased almost by 43%.

Analysis of **recommendations on taking medicines** by background characteristics of women showed results reflected in the Table 7.

The percentage of respondents receiving recommendations on taking medicines increases with age which reflects the natural history of hypertension.

Analyzing recommendations on taking medicines by region of residence of women respondents it was observed that while in some regions there was noticeable increase on medicine prescriptions (for example, in Absheron by 7.1%. in Ganja-Gazakh by 5.7%) in other regions this figure significantly decreased from 2006 to 2011 (in Dagligh Shirvan by 10.3%, in Lankaran by 9.4%).

This can be explained by use of different practices by health professionals in different regions when some of them make an emphasize on prescription of medicines and others - on consultation regarding life style habits.

Coming to wealth quintiles women in fourth and highest quintiles have higher probability of receiving recommendation to take medicines.

Table 7. Advice on taking medicine by background characteristics of women.

Background characteristics	AzDHS 2006	DHS 2011
Age		
15-24	79.1	77.1
25-29	89.8	90.0
30-39	91.4	94.1
40-49	96.4	94.6
Education		
Basic secondary or less	92.8	94.0
Complete secondary	94.4	91.9
Secondary specialized	92.0	94.9
Higher	90.0	95.8
Residence		
Urban	94.5	95.6
Rural	92.2	91.1
Region		
Baku	97.6	99.2
Absheron	90.0	97.1
Ganja-Gazakh	88.1	93.8
Shaki-Zagatala	97.2	94.7
Lankaran	90.8	81.4
Guba-Khachmaz	90.0	91.7
Aran	94.7	93.9
Yuxari Garabakh	90.9	88.0
Daghligh Shirvan	91.3	81.0
Wealth		
Lowest	87.1	88.6
Second	93.6	88.3
Middle	94.9	97.3
Fourth	95.6	95.6
Highest	95.4	97.4

Analysis of other kinds of recommendations by background characteristics of women is shown in Tables 8 and 9.

Recommendations to control weight are increasing by age of respondents which corresponds to patterns of prevalence of overweight. The probability of this kind of recommendations increases with education level of women. Naturally urban residents more predisposed to sedentary life and unhealthy diet receive more recommendations to control weight than their rural counterparts.

Interestingly while in total and in particular regions recommendations on weight control has increased during this 5-year period, in some other regions prevalence of such recommendations reduced: in Absheron by 11.6%, in Shaki-Zagatala by 20.1%, in Guba-Khachmaz by 35%.

Across wealth quintiles women from highest quintile have received more recommendations on weight control than others.

In 2006 **recommendations to cut down salt** were mainly given to respondents with higher level of education, urban residents, women living in Daghligh Shirvan, Guba-Khachmaz, Baku and Shaki-Zagatala regions from fourth and highest wealth quintiles. In 2011 none of these trends was observed. Probability of such kind of recommendations was not linked to education or wealth quintile of respondents. Interestingly while in some regions prevalence of this recommendation increased from 2006 to 2011 (in Yukhari Garabakh by 10.8%, in Aran by 17.3%) in other regions it decreased significantly (in Baku by 18.1%, in Absheron by 29.2%, in Guba-Khachmaz by 24.2%, in Daghligh Shirvan by 35.8%).

Table 8. Recommendation on healthy life style by background characteristics (1).

Background characteristics	Control weight		Cut down salt		Exercise	
	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011
Age						
15-24	18.6	32.4	47.6	60.0	18.6	11.8
25-29	32.7	40.0	61.2	60.0	20.4	33.3
30-39	34.8	47.5	56.2	50.5	21.2	17.8
40-49	41.0	44.6	58.9	55.4	24.1	23.8
Education						
Basic secondary or less	34.9	25.8	45.4	56.6	7.2	16.9
Complete secondary	42.8	31.4	53.5	53.7	19.0	19.6
Secondary specialized	47.9	51.3	69.0	55.6	33.6	25.6
Higher	53.5	58.6	75.7	57.7	44.3	33.8
Residence						
Urban	41.2	43.6	61.8	50.4	26.4	22.5
Rural	32.3	44.5	52.4	59.6	18.2	22.4
Region						
Baku	39.1	50.8	65.7	47.6	29.4	19.8
Absheron	34.5	22.9	51.7	22.2	17.2	11.1
Ganja-Gazakh	41.0	56.9	56.0	62.1	23.1	43.1
Shaki-Zagatala	54.3	34.2	64.7	65.8	45.7	21.1
Lankaran	31.2	32.2	44.7	39.0	5.3	13.3
Guba-Khachmaz	60.0	25.0	70.0	45.8	22.2	12.5
Aran	30.7	49.7	52.0	69.3	20.0	25.8
Yuxari Garabakh	50.0	52.0	60.0	70.8	11.1	29.2

Daghligh Shirvan	26.1	14.3	73.9	38.1	20.8	0
Wealth						
Lowest	25.2	35.8	45.2	51.4	13.0	15.1
Second	40.0	48.2	54.3	60.4	18.6	25.5
Middle	37.7	41.8	57.7	64.2	23.2	19.1
Fourth	33.1	37.4	58.8	49.1	23.5	20.2
Highest	49.1	56.5	71.6	50.9	35.2	31.0
Total	37.1	43.4	57.5	56.6	22.6	21.0

Coming to **recommendations to exercise** in 2006 they increased by age of respondents while in 2011 there is no correlation between these parameters. According to both surveys this recommendation prevailed among people with higher level of education. Naturally people from urban areas receive more recommendations on exercise than rural residents. In some regions prevalence of this recommendation has increased during 5 years (for example, in Ganja-Gazakh by 20%, in Yukhari Garabakh by 18.1%) while in other regions decreased (for example, in Shaki Zagatala by 24.6%, in Baku by 9.8%). In Daghligh Shirvan region none of respondents received recommendation to exercise in 2011.

Due to cultural and religious characteristics of the country there is low prevalence of alcohol consumption and tobacco smoking among women, which have been confirmed by nationally representative survey on risk factors for noncommunicable diseases (National Survey on Risk Factors for Chronic Noncommunicable Diseases in Azerbaijan, 2011). Therefore it is assumed by default that women don't drink alcohol or smoke. Consequently it is not surprising that in both surveys very low percentage of women were given **recommendation to cut down alcohol**. Since patterns of women population behavior didn't change a lot during 2006-2011 five-year period, the level of this recommendations hasn't changed as well. The prevalence of this recommendation doesn't change with age of women but positively correlates with level of education.

Table 9. Recommendation on healthy life style by background characteristics (2).

Background characteristics	Cut down alcohol		Stop smoking	
	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011
Age				
15-24	4.7	5.7	4.7	5.7
25-29	4.1	3.3	2.0	0
30-39	4.3	5.9	5.4	3.9
40-49	7.2	5.4	7.8	3.8
Education				
Basic secondary or less	3.1	2.4	3.1	1.2
Complete secondary	4.5	4.2	4.8	2.8
Secondary specialized	12.5	6.8	11.5	3.4
Higher	7.1	9.9	11.4	9.9
Residence				
Urban	7.2	5.4	8.4	4.3
Rural	4.5	5.0	3.8	2.9
Region				
Baku	9.4	7.2	13.0	4.8
Absheron	0	0	0	0
Ganja-Gazakh	0.7	9.2	0.7	9.2

Shaki-Zagatala	35.3	5.3	31.4	5.3
Lankaran	1.3	3.3	1.3	3.3
Quba-Khachmaz	10.0	4.0	0	0
Aran	4.0	5.5	2.7	1.8
Yuxari Garabakh	10.0	0	10.0	0
Daghligh Shirvan	0	0	0	0
Wealth				
Lowest	6.1	2.8	6.1	2.8
Second	3.6	0.9	2.2	0.9
Middle	2.9	4.5	2.2	0.9
Fourth	3.6	6.1	5.1	4.4
Highest	15.7	11.2	18.5	6.9
Total	5.9	5.4	6.3	3.6

As for distribution of this recommendation among regions there are several interesting findings which can be explained by alcohol consumption patterns in regions. In Absheron and Daghligh Shirvan none of women received advice to cut down alcohol nor in 2006 neither in 2011. While prevalence of this advice has increased significantly in Ganja-Gazakh (from 0.7% to 9.2%), it decreased dramatically in Shaki-Zagatala (from 35.3% to 5.3%) and Yukhari Garabakh regions (from 10% to zero).

As explained above **advice to stop smoking** was given to very low percentage of women in 2006 and 2011 irrespective of their age. There is positive correlation between this recommendation and education level of women as it was for recommendation to cut down alcohol. The regions of Absheron and Daghligh Shirvan again show zero prevalence of recommendations regarding stop smoking which can indicate low prevalence of smoking in this regions. Guba-Khachmaz region joined them in this pattern. As for other regions, trends on recommendation to stop smoking were similar to those for cut down alcohol. The highest prevalence of this advice was among women from highest wealth quintile in 2011 as well as in 2006.

By place of residence all recommendations prevail in urban areas compared with rural both in 2006 and 2011 with one exception. Recommendation on cutting down salt in 2011 significantly is more prevailed among rural population compared with urban.

In general, recommendations on taking medicines have increased in Baku, Absheron and Ganja-Gazakh regions.

Overall, data shows improvement of prevention work of health professionals in five-year period in Ganja-Gazakh, Aran and Yukhari-Garabakh regions, and weakening of disease prevention and promotion of healthy life style in Absheron, Shaki-Zagatala, Guba-Khachmaz and Daghligh Shirvan. This is surprising because exactly in this regions (Absheron, Shaki-Zagatala and Daghligh Shirvan) during 2006-2013 has been implemented Health Sector Reforms Project of Ministry of Health and World Bank.

Respondents' practices.

Coming to respondents practices, the percentage of women with hypertension taking medicines was approximately similar on both surveys with little increase in 2011 compared with 2006 (see Table 10). This figure increases with age of women which reflects the natural history of hypertension. Surprisingly the probability of taking medicines is not linked with education level of respondents. As for wealth quintiles, as expected women from lowest

quintile have the lowest level of medicine use while women from highest quintile show the highest percentage.

Analyzing recommendations on taking medicines by regions it was observed that while in some regions there was noticeable increase on medicine utilization (for example, in Absheron by 6.4%, in Ganja-Gazakh by 16.3%, in Daghligh Shirvan by 6%) in other regions this figure significantly decreased from 2006 to 2011 (in Shaki-Zagatala by 10.3%, in Lankaran by 8.3%). This data together with data on recommendations received by respondents from health professionals again shows tendency of prevalent drug therapy in Absheron or Ganja-Gazakh regions.

Table 10. Respondents taking medicines to lower their blood pressure

Background characteristics	AzDHS 2006	DHS 2011
Age		
15-24	69.8	71.4
25-29	76.0	80.0
30-39	80.0	85.1
40-49	89.2	89.0
Education		
Basic secondary or less	80.4	89.2
Complete secondary	85.5	85.2
Secondary specialized	84.1	88.0
Higher	82.9	88.7
Residence		
Urban	83.8	88.4
Rural	84.6	85.1
Region		
Baku	91.2	93.6
Absheron	79.3	85.7
Ganja-Gazakh	77.6	93.9
Shaki-Zagatala	97.1	86.8
Lankaran	81.6	73.3
Quba-Khachmaz	88.9	83.3
Aran	82.1	84.7
Yuxari Garabakh	90.0	87.5
Daghligh Shirvan	75.0	81.0
Wealth		
Lowest	76.1	79.2
Second	84.3	83.6
Middle	87.7	90.0
Fourth	83.8	88.7
Highest	88.1	91.4
Total	**84.2**	**86.2**

Compliance of respondents with recommendations on healthy life style was also analyzed and results are shown in the Table 11.

As expected young women of age 25-29, urban residents and women from highest wealth quintile pay more attention to their appearance and as result make more efforts to **control their weight**. Compliance with recommendation to control weight highly depends on education level of women and for 2006 rises from 10.4% among women with basic or less education to 55.7% among women with higher education. The same trend is observed in 2011. Overall, women in 2011 became more attentive to the issue of weight control.

Reduction of **salt consumption** among women population remained approximately at the same level from 2006 to 2011. Compliance to recommendation to cut down salt consumption rises with education level of women. Some regions have high percentages (Shaki-Zagatala, Baku, Yukhari Garabakh) whilst others (especially Absheron) do worse. If in 2006 there was noticeable linkage between cutting down salt and wealth quintile of women, in 2011 this pattern was not observed.

Table 11. Changes in behavior and life style of women in order to lower raised blood pressure.

Background characteristics	Control weight		Cut down salt		Exercise		Cut down alcohol		Stop smoking	
	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011	AzDHS 2006	DHS 2011
Age										
15-24	9.5	20	37.2	40.0	2.3	17.6	4.8	8.6	4.8	8.6
25-29	37.5	43.3	40.8	50.0	6.1	16.7	0	0	0	0
30-39	22.8	29.7	44.0	40.6	11.9	6.9	1.6	3.0	1.6	3.0
40-49	26.6	33.8	43.2	38.7	8.3	10.3	5.0	3.6	3.1	2.8
Education										
Basic secondary or less	10.4	22.9	28.9	34.9	4.1	3.6	1.0	2.4	1.0	1.2
Complete secondary	20.9	30.3	41.5	39.3	8.1	9.1	2.8	2.5	1.7	2.5
Secondary specialized	32.4	39.0	51.3	42.7	8.8	11.9	9.7	5.1	7.1	3.4
Higher	55.7	42.3	55.7	40.8	20.0	22.5	1.4	5.6	1.4	5.6
Residence										
Urban	31.5	37.8	49.1	41.6	12.1	13.5	4.1	3.3	2.3	3.3
Rural	17.9	27.4	35.4	37.7	5.1	7.5	3.1	3.9	3.1	2.5
Region										
Baku	39.3	45.2	58.8	34.1	18.8	11.1	6.5	3.2	2.4	3.2
Absheron	24.1	19.4	24.1	14.3	6.9	2.9	0	0	0	0
Ganja-Gazakh	17.8	41.5	43.0	54.5	3.0	20.0	0	3.1	0	3.1
Shaki-Zagatala	32.4	28.9	54.3	52.6	20.6	23.7	23.5	5.3	23.5	5.3
Lankaran	13.2	11.9	32.5	25.4	3.9	3.4	1.3	3.3	1.3	3.3
Quba-Khachmaz	44.4	8.3	44.4	25.0	10.0	8.3	0	0	0	0
Aran	20.0	36.2	28.5	48.5	3.3	10.4	1.3	5.5	1.3	3.7
Yuxari Garabakh	50.0	36.0	50.0	44.0	10.0	0	10.0	0	10.0	0
Daghligh Shirvan	17.4	10.0	56.5	30.0	8.7	0	0	4.8	0	4.8
Wealth										
Lowest	11.3	16.2	30.7	35.2	4.3	4.7	2.6	3.8	2.6	1.9
Second	22.9	30.0	32.9	40.9	9.3	10.9	2.1	1.8	2.1	1.8
Middle	25.5	33.6	46.7	50.0	5.8	8.2	3.6	2.7	2.2	1.8
Fourth	22.4	30.7	45.6	32.5	11.8	11.5	1.5	4.4	1.5	3.5
Highest	46.3	50.4	60.6	39.7	13.8	15.5	8.3	5.2	4.6	5.2
Total	25.2	30.3	42.9	41.1	8.9	9.2	3.6	3.9	2.6	3.2

Coming to recommendation to do more **exercises** the percentage of women compliant to this remained at the same level. However new generation of women population (age 15-24 and 25-29) are more compliant to this health life style habit while women who were at age 25-29 and 30-39 in 2006 and became a group of age 30-39 and 40-49 in 2011 didn't changed their life style on this regard and remained the same percentages. Percentage of women doing exercises rises by their level of education. Urban women are doing significantly more exercises than rural. This is not surprising taking into account that they obtain more recommendations on this regard from health professionals than their rural counterparts. Some regions remain relatively high percentages of women doing exercises both in 2006 and 2011 - Baku and Shaki-Zagatala. In Ganja-Gazakh and Aran region percentage of such women sharply increased as a result of increased percentage of recommendations from health providers on this regard.

The percentage of women who have **cut down alcohol** consumption to lower their blood pressure is almost similar for both surveys. There are some patterns by background characteristics of women. Women in youngest and oldest groups more tend to cut down alcohol. Urban and rural residents show almost similar percentages in both surveys. Women with secondary specialized and higher education and those from highest wealth quintile have higher probability to cut down alcohol. As it was described above among regions in Absheron and Daghligh Shirvan none of women received advice to cut down alcohol nor in 2006 neither in 2011. As result none of women from these regions cut down alcohol consumption in 2006, for Absheron this figure remained zero in 2011 as well. This can be explained by cultural features of these regions were women traditionally don't drink alcohol and therefore don't receive corresponding recommendations from health professionals. In Guba-Khachmaz women also didn't cut down alcohol consumption, but unlike Absheron and Daghligh Shirvan residents they received recommendations from health professionals to do so (10% of women in 2006 and 4.% in 2011). Another interesting fact is that while in some regions women less tend to cut down alcohol from 2006 to 2011 (in Baku, Shaki-Zagatala and Yukhari Garabakh this figure decreased) in other regions their proportion rises up (Ganja-Gazakh, Lankaran, Aran) which can be explained by rising attention of health professionals to this issue and provision of necessary recommendations in these regions.

Coming to **smoking cessation** it was again most prevalent in the youngest age group, among those with secondary specialized and higher education and women from highest wealth quintile. Among regions Absheron and Guba-Khachmaz have shown zero smoking cessation among women with hypertension in both surveys, Ganja-Gazakh and Daghligh Shirvan in 2006 and Yukhari Garabakh in 2011. These patterns again correspond to recommendations obtained by women from health professionals. In 2011 situation in Ganja-Gazakh, Lankaran, Dagligh Shirvan and Aran has significantly changed as it was for alcohol consumption.

HYPERTENSION AND OVERWEIGHT/OBESITY

Results of weight and height measurements of women show that prevalence of obesity among women has decreased approximately by 3% from 2006 to 2011. The decrease is considered to be significant because confidence intervals of these proportions don't overlap (in 2006 - 47.4% with 95% CI from 45.8% to 49.2%, in 2011 - 44.6% with 95% CI from 43.3 to 45.7%).

The mean BMI and proportion of women with overweight and obesity positively correlate with age of women (Pearson's correlation between these parameters was 0.483 in 2006). Relative risk of being overweight is higher in urban areas by 20-29% (29% - in 2006, 20% - in 2011) compared with rural. Across regions women from Baku, Absheron, Ganja-Gazakh and Yukhari Garabakh regions are more likely to have BMI above 25: both the prevalence of overweight in percents and mean BMI in these regions are higher than in others. Although prevalence of overweight and obesity here has dropped from 2006 to 2011 these regions remained at the top of list.

Mean BMI index is the lowest in lowest wealth quintile and highest in forth and highest wealth quintiles in 2006 as well as in 2011. This indicator is lowest for women with basic secondary and less education in both surveys.

Table 12. Prevalence of overweight and obesity among women age 15-49 in 2006 and 2011.

Background characteristic	2006				2011			
		Overweight/obese				Overweight/obese		
	Mean Body Mass Index (BMI)	BMI>25.0 (Total overweight/ obese)	25.0-29.9 (Overweight)	>30.0 (Obese)	Mean Body Mass Index (BMI)	BMI>25.0 (Total overweight/ obese)	25.0-29.9 (Overweight)	>30.0 (Obese)
Age								
15-19	21.4	9.7	8.0	1.6	21.5	12.4	10.7	1.6
20-29	23.4	28.9	23.0	5.9	23.0	24.3	18.1	6.2
30-39	26.8	62.4	40.4	22.0	26.6	58.4	36.2	22.2
40-49	28.6	74.8	39.0	35.8	29.2	78.0	37.3	40.7
Residence								
Urban	25.9	52.6	31.5	21.1	25.7	48.1	27.3	20.8
Rural	24.8	40.8	26.9	13.8	24.7	40.0	24.2	15.8
Region								
Baku	26.0	53.9	32.6	21.4	25.6	47.9	27.7	20.2
Absheron	25.9	53.6	33.0	20.6	26.5	51.1	26.4	24.7
Ganja-Gazakh	26.8	54.6	27.5	27.2	25.6	47.2	28.1	19.1
Shaki-Zagatala	24.2	35.3	24.5	10.8	24.3	35.9	21.2	14.7
Lankaran	24.8	39.4	23.7	15.7	24.4	37.8	21.4	16.3
Guba-Khachmaz	23.9	39.0	34.6	4.4	24.8	42.7	26.3	16.4
Aran	24.9	42.6	28.5	14.1	25.2	44.8	26.5	18.3
Yukhari Garabakh	25.6	54.0	37.5	16.5	26.0	48.6	24.5	24.2
Daghligh Shirvan	24.2	35.4	22.3	13.1	23.9	34.2	22.7	11.5
Education								
Basic secondary or less	24.4	37.5	24.9	12.7	24.5	37.6	22.7	14.9
Complete secondary	25.6	48.7	29.4	19.2	25.4	45.8	25.9	20.0
Secondary specialized	26.2	55.4	32.4	23.0	26.2	53.9	31.5	22.5
Higher	25.5	50.3	34.3	16.0	24.8	39.4	24.3	15.1
Wealth quintile								
Lowest	24.4	38.1	26.3	11.8	24.2	36.2	21.8	14.4

Second	25.0	41.6	26.2	15.4	25.0	42.4	25.8	16.6
Middle	25.5	48.1	30.1	18.0	25.5	46.6	26.1	20.5
Fourth	26.0	53.7	31.7	22.0	25.9	49.7	28.3	21.4
Highest	26.1	54.3	32.7	21.6	25.7	48.4	27.9	20.5
Total	25.4	47.4	29.5	17.9	25.2	44.6	25.9	18.6

BMI of women respondents from both surveys was also analyzed by their blood pressure level. Results of this analysis are sown in the Table 13. As it was expected prevalence of hypertension rises with BMI. Among women with BMI above 25 prevalence of hypertension is about 2.7 times higher than among those with normal BMI (relative risk is 170%).

Table 13. Prevalence of hypertension by BMI of women (%).

BMI	2006		2011	
	Prevalence of hypertension	Optimal blood pressure	Prevalence of hypertension	Optimal blood pressure
<18.5	5.9	91.3	4.1	70.0
18.5-24.9 (normal)	9.4	62.8	8.9	52.7
>=25.0 (overweight)	24.9	38.8	24.0	33.5
Missing	10.4	35.9	14.0	44.9
Total	16.4	54.2	13.0	44.4

As it is seen from Table 14 the biggest proportion of women with hypertension at the moment of the both surveys have BMI above 25: for 2006 this proportion was 77.8%, for 2011 - 53%.

Table 14. Distribution of women with raised blood pressure by BMI (%).

BMI	2006	2011
<18.5	1.5	5.3
18.5-24.9 (normal)	20.7	38.3
>=25.0 (overweight)	77.8	52.9
Missing	0	3.5
Total	100.0	100.0

Women with hypertension were also analyzed by obtaining recommendations on taking medicines, cut down salt and do more exercises taking into account their BMI. As it is seen from Tables 15.1 and 15.2 only 39.6% of women with hypertension and BMI over 25 received recommendation to control their weight in 2006, and 45% - in 2011. Surprisingly prescription of antihypertensive medicines was lower among these women compared to women with normal BMI. Percentage of recommendations to do more exercises was also very low for such kind of women with hypertension.

Table 15.1 Women with hypertension by BMI index who received recommendations from health professionals (2006)

	Told to do: Take medicine	Told to do: Control weight	Told to do: Cut down salt	Told to do: Exercise	Total (number of women in the line)
<18.5	100.0	40.0	80.0	33.3	10
18.5-24.9 (normal)	98.4	29.8	42.6	16.5	121
>=25.0 (overweight)	97.4	39.6	62.8	25.2	456
Total	97.6	37.5	58.9	23.5	587

Overall, all recommendations for women with hypertension were at insufficient level, particularly for those who have accompanying overweight or obesity. So consultations by health care providers on prevention of combination of these two most prevalent among women risk factors for noncommunicable diseases are at noticeably low level and need to be strengthened.

Table 15.2 Women with hypertension by BMI index who received recommendations from health professionals (2011)

	Told to do: Take medicine	Told to do: Control weight	Told to do: Cut down salt	Told to do: Exercise	Total (number of women in the line)
<18.5	96.0	41.7	52.0	20.0	25
18.5-24.9 (normal)	98.4	47.9	56.8	20.6	190
>=25.0 (overweight)	95.9	45.0	55.4	25.9	269
Missing					17
Total	97.0	45.8	55.9	23.0	501

There were also some questions on nutrition patterns among women and responses of women with hypertension were analyzed (see Tables 16.1 and 16.2). Not all women respondents with hypertension answered these questions but received responses provide general picture of nutrition patterns among such women in Azerbaijan.

Table 16.1. Nutrition patterns of women with hypertension by BMI (2006)

	Liver, heart, other organs	Meat (beef, pork, lamb, chicken, etc)	Fish or shellfish	Oil, fats, butter, products made of them	Chocolates, sweets, candies, pastries, etc	Total (number of women in the line)
<18.5 (thin)	0.0	66.7	0.0	25.0	50.0	4
18.5-24.9 (normal)	20.8	66.0	13.7	51.9	67.9	53
>=25.0	18.8	72.5	12.3	48.8	58.0	80
Total	19.0	69.9	12.5	49.3	61.6	137

Table 16.2 Nutrition patterns of women with hypertension by BMI (2011)

	Liver, heart, other organs	Meat (beef, pork, lamb, chicken, etc)	Fish or shellfish	Oil, fats, butter, products made of them	Chocolates, sweets, candies, pastries, etc	Total (number of women in the line)
<18.5 (thin)	0.0	83.3	0.0	83.3	100.0	6
18.5-24.9 (normal)	33.3	75.8	18.2	57.6	78.8	33
>=25.0	26.1	80.4	17.0	61.7	83.0	47
Missing	16.7	83.3	16.7	66.7	50.0	6
Total	26.4	79.1	16.3	62.0	80.4	137

There is a very big proportion of women eating different kinds of meat among hypertensive women with different BMI but this figure is the most upsetting among those with BMI above 25. Very low percentage of women with hypertension eat fish, while oils and fats, chocolates and other sweets are very popular.

As a result of all patterns analyzed above, such as obtaining adequate consultation on hypertension and compliance to received recommendations, behavior patterns on taking medication, nutrition and physical activity among women with hypertension, some of them faces serious cardio-vascular problems as a part of their health status over age 40 (see Table 17).

Table 17. Women with hypertension ever diagnosed with definite cardio-vascular diseases (2006 and 2011)

BMI	2006			2011		
	Ever been diagnosed with heart attack or myocardial infarction	Ever been diagnosed with a stroke	Total (number of women in the line)	Ever been diagnosed with heart attack or myocardial infarction	Ever been diagnosed with a stroke	Total (number of women in the line)
<18.5 (thin)	0.0	0.0	9	2.5	0.0	40
18.5-24.9 (normal)	6.0	0.0	117	6.9	2.1	289
>=25.0	8.3	1.3	539	8.8	2.2	409
Missing				6.9	3.4	29
Total	7.8	1.1	665	7.7	2.1	767

About 7% of women with hypertension have ever been diagnosed with heart attack or myocardial infarction, additional 1.1-2.1% with stroke. According to Global Burden of Disease 2010 data in terms of the number of years of life lost (YLLs) due to premature death in Azerbaijan, ischemic heart disease, lower respiratory infections, and cerebrovascular disease were the highest ranking causes in 2010.

Although heart attacks and strokes are major killers in all parts of the world, 80% of premature deaths from these causes could be avoided by controlling the main risk factors: tobacco, unhealthy diet and physical inactivity. According to DHS surveys data these diseases are more prevalent among women with both hypertension and overweight. Therefore special focus from health system should be made on women with this combination of risk factors for noncommunicable diseases.

CONCLUSION

Overall, prevalence of hypertension among women in Azerbaijan has significantly decreased between 2006 and 2011. Results confirm a strong positive association between obesity and hypertension among women. The study finds that, independent of other factors, the prevalence of obesity and prevalence of hypertension have positive associations with age in women, as expected [7]. Rural residents are more likely to have hypertension than their urban counterparts. However urban residence has a positive association with obesity in women [8]. Recommendations of health care providers on prevention of certain risk factors for women with hypertension and/or overweight have significant influence on their behavior patterns. The most noticeable decrease on hypertension prevalence was observed in Ganja-Gazakh, Lankaran and Aran regions. At the same time women in these regions obtained more recommendations from health professionals on healthy life style and were on the top of the list of those who changed their behavior and life style in order to lower blood pressure. Shaki-Zagatala has shown high enough level of consultations from health care providers on risk factors for hypertension both in 2006 and 2011 despite the fact that in 2011 it decreased. However prescription of medicines on hypertension here and percentage of women from this region taking medicines decreased from 2006 to 2011. Consequently prevalence of hypertension here hasn't decreased a lot.

WHO's recommendations for preventing and managing obesity emphasize the need for early prevention to ensure lifelong healthy eating and physical activity patterns. Participation in 150 minutes of moderate physical activity each week (or equivalent) is estimated to reduce the risk of ischaemic heart disease by approximately 30%, the risk of diabetes by 27%, and the risk of breast and colon cancer by 21–25%. Physical activity also lowers the risk of stroke, hypertension and depression.

Overall, all recommendations for women with hypertension both in 2006 and 2011 were at insufficient level, particularly for those who have accompanying overweight or obesity.

Therefore there is a need for strengthening prevention activities at primary health care level on unhealthy diet, physical inactivity and weight control. Focusing on a combination of risk factors for cardiovascular disease at once, implementing medical screening for individuals at risk and then providing effective and affordable treatment to those who require it can prevent disability and death and improve quality of life.

A major limitation of our analysis is the cross-sectional nature of the data. In the AzDHS 2006 and DHS 2011 the prevalence of overweight, obesity and hypertension were measured at the time of the survey. In this study, we were not able to consider other measures of obesity, particularly abdominal obesity, which may be more relevant for linking obesity with the risk of hypertension. In Asian populations, abdominal or central obesity is more common than obesity defined by BMI, and health risks associated with overweight and obesity occur at lower levels of BMI than in North America or Europe [9].

Another limitation is that the survey did not collect direct information on total energy intake. Instead, it was assessed indirectly from a number of diet history and food frequency questions, which have been evaluated previously and found to be sufficiently valid for etiologic studies [10].

In conclusion, this study provides important new information on the prevalence of obesity and hypertension among women in different sub-groups in Azerbaijan. The results show a strong positive effect of obesity on the risk of hypertension in women and need for implementation of prevention activities addressing both of these risk factors for cardiovascular and other noncommunicable diseases.

ACKNOWLEDMENTS

REFERENCES

1. Priority Medicines for Europe and the World 2013 Updates. World Health Organization, 2013.
2. Global Burden of Diseases, Injuries and Risk Factors Study 2010. World Health Organization, 2010.
3. National Survey of risk factors for chronic noncommunicable diseases in Azerbaijan, 2011. Public Health and Reforms Center of ministry of Health, 2011.
4. Azerbaijan Demographic and Health Survey 2006 (2008).
5. Demographic and Health Survey, Azerbaijan, 2011 (2013).
6. State Statistical Committee of Azerbaijan Republic, 2015 data.
7. Meigs JB (2002). Epidemiology of the metabolic syndrome, 2002. Am J Manag Care 8, S283–S292.
8. Popkin BM (2002). An overview on the nutrition transition and its health implications: the Bellagio meeting. Pub Health Nutr 5, 93–103.
9. The Asia-Pacific Perspective: Redefining Obesity and Its Treatment. World Health Organization: Geneva. World Health Organization (WHO), International Association for the Study of Obesity (IASO) and International Obesity Task Force (IOTF) (2000).
10. Application of the method of triads to evaluate the performance of food frequency questionnaires and biomarkers as indicators of long-term dietary intake. Kabagambe EK, Baylin A, Allan DA, Siles X, Spiegelman D, Campos H (2001). Am J Epidemiol 154, 1126–1135.
11. Relationship of physical activity and body mass index to the risk of hypertension: a prospective study in Finland. Hu G, Barengo NC, Tuomilehto J, Lakka TA, Nissinen A, Jousilahti P (2004). Hypertension 43, 25–30.