



## Urbanization and Non-Communicable Risk Factors in the Capital City of 6 Big Provinces of Iran

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### Abstract

**Background:** The prevalence of non-communicable diseases such as hypertension and diabetes including obesity has increased over the past few years in Iran. The increase in these diseases has been associated with increased urbanization and lifestyle changes. The burden of non-communicable diseases (NCD) is increasing in low and middle-income countries. The aim of this report is to address the threat of NCDs in the capital city of 6 big provinces of Iran.

**Methods:** A community based cross sectional study was carried out between March 2010 to January 2011 in 6 provinces' capital cities (Isfahan, Karaj, Mashad, Shiraz, Tabriz, and Tehran). Participants were men and women of 30 years and older who had been screened through the National Diabetes Prevention and Control Program. BMI, blood pressure, fasting blood glucose and lipids were measured.

**Results:** 439406 cases (60% female & 40% male) were studied. The prevalence of pre-diabetes (13%), diabetes (13%), hypercholesterolemia (14%), hypertension (11%), overweight (27%) and obesity (20%) was higher than expected. Only 35% of participants were healthy.

**Conclusion:** This study reveals a high prevalence of NCDs in urban living population in those capital cities. It also shows that increasing urbanization may be an important threat to public health regarding NCDs especially in developing countries. It is crucial to implement a comprehensive NCD program (across the life time) in the health system with a strong collaboration with all stakeholders (governmental and non-governmental sector, academic, research centers and scientific associations) in the community (Multisectoral Approaches).

**Keywords:** Non-communicable disease, Risk factors, Urbanization, Iran

### Introduction

Significant demographic, social and economic changes have been happened in countries include rapid urbanization, expanded education, increased industrialization, rising incomes in past few decades. In other hand, improved health care have resulted in the control of many infectious diseases and reduction in mortality especially in younger ages. These demographic changes have led to an aging population and NCDs and other degenerative diseases are more prevalent in this population.

Chronic diseases are the leading cause of 63% of all deaths in the world. Out of the 36 million people who died from chronic disease in 2008, nine million were under 60 and ninety per cent of these premature deaths occurred in low- and middle-income countries (1).

NCD risk factors can be categorized as "modifiable" and "non-modifiable". Modifiable parameters include factors that can be altered such as individual and community influences, living and working

conditions and socio-cultural factors. Non-modifiable parameters include those factors that are beyond the control of the individual, such as age, sex and genetic factors (2). Diabetes mellitus, cardiovascular diseases, cancer, and chronic obstructive pulmonary diseases are linked by common preventable risk factors related to lifestyle (unhealthy diet, physical inactivity, obesity and overweight, and tobacco use). Therefore, the prevention of these diseases can be achieved by a common focus of controlling these risk factors in an integrated manner (3).

According to the Alma Ata Declaration, effective management of diseases should include three aspects: promotive (includes policy actions and inter-sectoral local actions), preventive (includes personal and behavioral actions and education to encourage behavioral modification) curative and rehabilitative (services focusing on individuals who are already diagnosed, to prevent complications) (4).

The prevalence of non-communicable diseases such as hypertension and diabetes including obesity has increased over the past few years in Iran (5). The increase in these diseases has been associated with increased urbanization and lifestyle changes. The burden of non-communicable diseases (NCD) is increasing in low and middle-income countries (1).

National Diabetes Prevention and Control Program (NDPCP) has been designed focusing all 3 levels of prevention (6) and has been implemented in the Iranian Health System in 2004. "The first phase" of initiated in September 2004 in rural areas and cities with population less than 20000. "The first phase" is performing in the Primary Health Care System.

The need to apply an integrated approach to control of NCDs in Iran led to plan an integrated approach to the control of NCDs in the country base on the infrastructure of NDPCP. Then, "the second phase" of NDPCP redesigned regarding this issue. And, "the second phase" has been started in March 2009.

The program comprises six components including "education and awareness" (policy makers, health professionals, public, high risk populations, pa-

tients and their families), "screening" (in high risk individuals 30 years old and over), "diagnosis", "patient management", "program monitoring and evaluation". All guidelines and educational materials are prepared and distributed.

The objective of this report was to address the threat of NCDs in the capital city of 6 big provinces of Iran. The practical aim was to assess the feasibility of the implementation of an integrated approach to control of NCDs via the second phase of NDPCP performance in Iran.

## Materials and Methods

### Study design

This community based cross sectional study was carried out between March 2010 to January 2011 in 6 provinces' capital cities (Isfahan, Karaj, Mahshad, Shiraz, Tabriz, and Tehran) in Iran. Participants were men and women of 30 years and older who had screened through the National Diabetes Prevention and Control Program. Target population (people age 30 years old and older) in these cities was 863091 based on national census 2006.

Thereafter public awareness, participants have admitted at "Diabetes Unit" located at "Public Health Centers" and have undergone the program procedures.

In a standardized manner based on program protocol, an interviewer-administered structured questionnaire was used to obtain relevant data on socio-demographic variables like age, sex, current history of tobacco use, presence of hypertension, diabetes mellitus, and dyslipidemia. In addition, any family history of diabetes in the first degree relatives and any history bad gynecologic outcomes (stillbirth, recurrent abortion, giving birth to a macrosomic newborn) were assessed.

Totally 439406 (60% female & 40% male) were interviewed using a questionnaire included demographic data. Blood pressure, weight, height, and waist circumference were measured.

### Measurements

Weight was taken with light clothing on with the aid of a weighing scale with the weights measured

to the nearest 100 gr and height was measured using a stadiometer. Then, body mass index (BMI) was calculated from weight (in kg) divided by a square of the height (in meters). Waist circumference was measured in all subjects.

Blood pressure (BP) was measured in the left arm in the sitting position using a mercury sphygmomanometer at sitting position after 5 minutes rest. The systolic blood pressure was recorded at phase I Korotkoff sounds while the diastolic blood pressure was recorded at phase V. All measurements were taken twice and the average of the 2 readings was taken as final.

Participants who had risk factors based on program protocol were eligible for laboratory screening and were referred to "the Selected Laboratory". After 10-12 hours of overnight fast, venous samples were obtained from the participants. The serum was immediately separated by centrifugation, and the concentration of triglycerides (TG), total cholesterol (TC) and high-density lipoproteins (HDL-C) were tested. Low-density lipoprotein (LDL-C) was calculated using the Friedewald Equation ( $LDL = Total\ Cholesterol - HDL - 1/5\ Trigs$ ), but only if the serum triglyceride is 400 or less (7). Fasting plasma glucose was also measured by enzymatic kit.

Regarding precision of performance of the national program, at least two samples of internal quality control are run with every batch of samples analyzed. External quality assurance evaluation is undertaken by the Health Reference Laboratory at a regular base. On the other hand, all laboratory instruments are checked regularly and also all laboratory staffs are retrained frequently.

#### Definition of Risk Factors

Presence of at least one person with diabetes in first degree relatives considered positive "family history of diabetes". Use of antihypertensive drugs or persistently elevated blood pressure ( $>140/90$  mmHg) was taken as "hypertension". "Diabetes" was regarded as a positive history, use of anti-hyperglycemic medications or a fasting plasma equal or more than 126 mg/dl, after recheck it.

Use of medication or persistently alteration in lipids was taken as "dyslipidemia".

"Lipid profile" was considered abnormal if Total cholesterol was more than 200 mg/dl, LDLc was more than 130 mg/dl, triglycerides was more than 150 mg/dl and HDLc was considered to be low if it was less than 40 mg/dl in males and less than 50 mg/dl in women (8). The WHO classification was used to define the obesity and overweight (9). The anthropometric equipments were calibrated at start of every clinic and re-checked.

#### Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 16. Initial analysis produced descriptive statistics for continuous variables. Frequency of variables was calculated for both sexes.

#### Results

Totally, 439406 individuals (60% female, 40% male) were studied. Their age ranged from 30 to 78 years. Of them, 35% were far from having disease and risk factors (Table 1).

**Table 1:** the frequency of NCD risk factors in big cities in Iran

Variable	Prevalence (%)	Sex Proportion	
		Female (%)	Male (%)
Without any risk factor	35	61	39
Pre-diabetes	11	69	31
Diabetes	13	70	30
Hypertension	14	65	35
Hypercholesterolemia	14	72	28
Hypertriglyceridemia	14	65	35
Low HDL level	20	71	29
Overweight	27	68	32
Obesity	20	78	22

Note: Sum up of the prevalences is more than 100, because a patient can be counted more than once due to have several different risk factors. (A person can be overweight and hypertensive and hyperlipidemic).

The prevalence of pre-diabetic state was 11% (69% female, 31% male) and the prevalence of diabetes mellitus (DM) was 13% (70% female, 30% male) (Table 1). Women were 2.3 times more likely to develop diabetes than men. 80 percent of diabetics were known patients and were on treatment and 20% were newly diagnosed. 38 percent of diabetics had good metabolic control (HbA1C less than 7%).

The hypertension prevalence among the study subjects was 11%. Hypertension was 2.1 times more prevalent in men than men (Table 1). More than half of hypertensive patients were not aware of their disease.

27 percent of participant was overweight (68% females and 32% male). The prevalence of obesity in people who live in big cities in Iran was 20%. Females were significantly more affected than male across all grades of obesity and overweight (Table 1).

Dyslipidemia was also prevalent in participants in this study. The prevalence of hypertriglyceridemia (HTG) and hypercholesterolemia (HCH) were similar (both 14%). 65 percent of subjects with HTG were women and 35% were men. Additionally, 72% of women had raised total cholesterol and 28% of men. Surprisingly, the prevalence of low HDL level was very high (20%).

## Discussion

Iran is a country with about 75 millions population (49% female and 51% male) which 75% of population lives in urban areas. Urbanization is growing from 68% to 75% during last 5 years (10). The present study revealed that the prevalence of risk factors of NCD were high among the inhabitants 30 years old and over in big cities in Iran. A large number of affected people were undiagnosed.

Urbanization is related to dramatic changes in life-style that is in turn increase the prevalence of obesity (11) and diabetes (rise from 2.8% to 4.4% by 2030) (12).

In developing countries, the rise in burden of cardiovascular diseases (CVD) is largely the result

of an increased in the prevalence of risk factors and also a relative lack of access to efficient interventions in these countries (13).

The prevalence of pre-diabetes and diabetes in big cities (cities with more than one million inhabitants) was high and it supports the previous finding in Iran (5, 14, 15). But it is higher in comparison to rural areas (13% vs. 3.2%) (Unpublished data-the NDPCP in Iran). This proportion had been reported previously (16). The risk of being pre-diabetic or diabetic was greater in women than men. It has been reported previously (5, 17). Diabetics are expected to rise from 366 million in 2011 to 552 million by 2030, if no urgent action is taken. This equates to approximately three new cases every ten seconds or almost ten million per year (18).

Hypertension was prevalent in 11% of participants. It is comparable to that found by other researches in the recent past in Iran (5, 19). It is important to note that in the present study, obese women defined by BMI or waist circumference had an increased risk of hypertension. It has been reported formerly (20).

The prevalence of overweight and obesity was 27% and 20%, respectively. Females were more likely to be overweight or obese than males. It was in agreement with previous reports (5, 13, 19).

The distribution of blood total cholesterol showed high values in subjects. 14 percent of subjects were hypercholesterolemic. It was significantly more prevalent in women than men. This finding is similar to previous studies in Iran (5, 19). Hypercholesterolemic was not sex dependent in a study in India (16).

The prevalence of hypertriglyceridemia was high in participants and was more prevalent in women. No statistically significant difference sex differences have been reported in Tehran, previously (5). But HTG has been reported more prevalent in male than women in other studies (16, 19).

This study found that 20% of subjects aged  $\geq 30$  years had low HDL levels. There was a significant prevalence in women than men. This finding is in accordance with previous reports (19).

In conclusion, the present study revealed that the growing NCDs are a particular problem in urban



areas in Iran as other countries (21, 22). NCDs are a major disease burden in the Eastern Mediterranean region and may be controlled by marked changes in lifestyle (23).

Rapid rise in obesity and overweight people due to nutrition alteration (fast food) and sedentary lifestyle have affected health, dramatically. Obesity and overweight causes serious metabolic disorders such as diabetes, cardiovascular disease, Hypertension, fatty liver, and cancers.

NCDs are preventable using available knowledge and interventions are effective and highly cost-effective.

As a result, it is crucial to implement a comprehensive NCD program (across the life time) in the health system with a strong collaboration with all stakeholders (governmental and non-governmental sector, academic, research centers and scientific associations) in the community (Multispectral approaches).

## Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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The authors declare that there is no conflict of interest.

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