

Tehran Lipid and Glucose Study: A Legacy for Prospective Community-based Research

Non-communicable diseases (NCDs) are the leading causes of morbidity and mortality in the adult population. The growing burden imposed by major NCDs (coronary heart disease, stroke, diabetes, and respiratory disturbances), particularly in the developing countries, overwhelms the already strained health services. Primary prevention of the factors underlying the major NCDs is the most cost-effective approach to containing this emerging epidemic.¹

According to the WHO, NCDs contributed to 36 million deaths (63% of total deaths) globally in 2008² and mortality due to NCDs increased from 57% of total mortality in 1990 to 65% in 2010.^{3,4} In southwest Asian countries, cardiovascular and ischemic heart disease, chronic obstructive pulmonary disease and diabetes mellitus are among the six leading causes of death.⁵

Unfortunately, despite many surveys from the countries of this region, there are only a few surveillances. Surveys are often done only once to determine the distribution of risk factors in populations at a particular point in time. Often an appropriate first step towards initiating surveillance is to conduct a baseline survey of a sufficient sample size to have the power to detect meaningful changes over time. If well conducted, such a survey can provide vital information for determining priorities of intervention, and for raising public and political awareness of the extent of public health problems.

However, too many cross-sectional surveys employ different approaches, definitions, and methodologies. A baseline survey is only the first step in what ideally should become an ongoing surveillance system that builds on multiple sources of health information. Surveillance has been defined as the systematic collection, analysis, and interpretation of health data and timely dissemination of such data to policymakers and others. In particular, surveillance provides the knowledge to support health promotion and disease prevention, and it should take place in the context of efforts to improve population health.

In the West Asia region, the Islamic Republic of Iran conducts surveillance programs on NCDs. Like most developing countries that have undergone rapid economic and demographical transition, NCDs, especially cardiovascular disease, are the major cause of mortality and morbidity in Iran.⁶⁻⁸ The first national project for prevention and control of NCDs began in 1996 as “the National Network for Prevention and Management of Diabetes”. This program is now operating in a network in all provinces.⁹

The Tehran Lipid and Glucose Study (TLGS), begun in 1987, is a large-scale community-based prospective study being performed on a representative sample of residents of district 13 of Tehran.¹⁰ The first phase of the TLGS was conducted within the framework of a national project of the scientific research council of the Islamic republic of Iran to investigate hypertension, hyperlipidemia, diabetes, obesity, cigarette smoking, and other NCD risk factors. Results from the first phase of the TLGS revealed a high prevalence of NCD risk factors; 78% of adult men and 80% of women presented with at least one NCD risk factor in a representative population of Tehran from 1998 to 2000. The results of

the first phase showed a very high prevalence of NCD risk factors. The prevalence of hypertension, obesity, diabetes mellitus, high cholesterol, low HDL, high triglycerides, and smoking was 22.9%, 23.1%, 10.6%, 23.6%, 21.1%, 4.2%, and 10.6%, respectively. Two or more NCD risk factors were found in 9% of boys and 7% of girls. Metabolic syndrome was seen in 32% of adults¹⁰ and 10% of adolescents.¹¹ The age-adjusted prevalence of CHD based on the presence of any of rose angina, self-reported history of CHD and ECG defined CHD was 21.8%.^{10,11} Following baseline data collection, the investigators designed the second phase, “intervention to change lifestyle”, in order to decrease the prevalence of risk factors of major NCDs. All 15005 individuals studied in phase 1 were divided into two groups - the intervention and control groups. Lifestyle interventions are directed towards changes in nutritional habits, increased physical activity, decreased cigarette smoking, and better management of stress. Primary interventions are implemented by face-to-face education through discussions with each family once a year, education of children in schools, public education in community gatherings, enhancing knowledge and attitudes by distributing pamphlets, information booklets, and monthly bulletins. Community mobilization and participation, peer teaching, community health projects and campaigns facilitate all these activities.¹² General data include interviews to complete questionnaires, conduct examinations, and measure blood pressure, serum glucose and lipids. Glucose tolerance tests and electrocardiograms are done in individuals aged ≥ 20 and ≥ 30 years, respectively. Specific data include nutritional surveillance, questionnaires estimating physical activity and cigarette smoking and various clinical trials conducted during implementation of secondary prevention strategies. Data for outcome events include in-hospital and out-of-hospital deaths, non-fatal events such as myocardial infarction, strokes, diabetic nephropathy and retinopathy, cancers, etc. All data are compiled in a computer database.

Measurement measurements are repeated every 3 years to assess any change of NCD risk factors in the control group and changes related to intervention in the case group.

Up to June 2014, more than 10 guidelines and statements for assessment and control of NCDs have been generated based on the TLGS, many of which have been used for national and provincial NCD programs. Over 250 international articles have been published from TLGS data. Studies on cardiovascular risk factors have defined prevalence and incidence of risk factors, predictors of CVD risk factors in adolescents and adults, and the related social determinants of CVD health.^{13,14} In addition, some predictive values of risk factors were designed, and TLGS is one of the few studies that have verified the cardiovascular model of Framingham study.¹⁵

Anthropometric studies of TLGS disclosed overweight and obesity along with metabolic syndrome as major health problems in the capital city of Tehran¹⁵ and defined the waist circumference cut-off value in Tehranian population to be used in the definition of metabolic syndrome in Iran.¹⁶

Studies related to diabetes mellitus in TLGS have revealed high

prevalence of diabetes and IFG and IGT with an ever-rising incidence of approximately 1% per year in this Tehranian population.¹⁷

Various studies have shed light on lipid derangement and hypertension as major risk factors of CVD.^{18,19} Nutritional studies in the TLGS have shown inappropriate nutritional habit and their correlation to CVD risk factors and disease.^{20,21}

Community-oriented lifestyle change has proven to be effective. A significant decrease in the incidence of type 2 diabetes²² and in the prevalence of the metabolic syndrome and its components has been documented.²³

The recently published 2010 Burden of disease in Iran as part of the global burden of diseases 2010 has also clearly shown a shift away from premature death to years lived with disability and from infectious and communicable disease etiologies to NCD.^{24,25,26,27}

Several other ongoing long-term prospective Iranian studies in addition to TLGS are now running in Iran, including the Isfahan health study,⁷ the Caspian study for childhood obesity²⁸ and the Golestan Cohort study.^{29,30} In addition to monitoring the impact of NCDs on population health, these studies are trying to test early low-cost but sustainable care which includes both lifestyle and pharmacologic interventions to prevent co-morbidities and premature death from NCDs.

In this issue of the Archives of Iranian Medicine (AIM), some articles have been published on TLGS and others concerns with NCD in Iran. I would like to acknowledge the editor of AIM, and hope that these and other studies illuminate various aspects of NCDs in Iran and provide the possibility of preventing or delaying the onset of NCD risk factors and disorders in developing countries.

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