

**ASSESSMENT OF RISK FACTORS ASSOCIATED WITH
NON COMMUNICABLE DISEASES: RESULTS OF
COMMUNITY BASED STUDY IN KESHAVPURAM,
NEW DELHI**

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at
IIHMR University, Jaipur**

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TO WHOMSOEVER MAY CONCERN

This is to certify that Shipra Pandey student of MBA Pharmaceutical Management from IIHMR University, Jaipur has undergone internship training at IIHMR University, Jaipur from February to May.

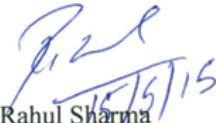
The Candidate has successfully carried out the study designated to him during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.



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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled “Assessment of Risk Factors associated with Non communicable diseases: Results of Community based study in Keshavpuram” New Delhi and submitted by Shipra Pandey, Enrollment No. IIHMR-U/02/2013-2015/0011 under the supervision of Mr. Rahul Sharma for award of MBA Pharmaceutical Management of the university carried out during the period from Feb to May embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

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Abstract

Background & objectives: Recent studies suggest that non communicable disease mortality is increasing to a larger extent. The objective which were assessed are, the burden of NCD risk factors, estimation of the relations of behavioural risk factors to socio-demographic strata, evaluation if socio-demographic, behavioural risk factors predicted biochemical risk factors; and pattern of health insurance among people.

Methods: A total of 111 individuals 55 women and 56 men of middle income community in New Delhi were selected. Using non probability sampling, descriptive study was done on families living in Delhi Development authorized middle income group (DDA MIG) flats. Information on behavioural risk factors; tobacco use, diet, physical activity, alcohol use, blood pressure was collected. Using correlations and risk analysis the associations between socio-demographic and risk factors were estimated.

Results: The burden of NCD risk factors was high in my sample. High prevalence of non communicable diseases was found in some of the age categories. Behavioural and each of the biochemical risk factors were significantly present in the respondents. The odds ratios relating some of the behavioural risk factors to morbidities were significant. Few respondents were observed with health insurance but many of them who did not had health insurance availed the OPD and emergency services. Large hospitalizations cost burden people with huge debt

Interpretation & conclusions: In this study of community-based sample in Keshavpuram, Delhi high burden of NCD risk factors was observed. These data may serve to propel multispectral efforts to lower the community burden of NCD risk factors.

Keywords: *Non communicable diseases, NCD, behavioural risk factors, insurance, odds ratio*

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Introduction

According to World Health Organization Non-communicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. They are of long duration and generally slow progression. The four main types of non-communicable diseases are cardiovascular diseases (e.g. hypertension and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes.¹

Various behavioral factors namely smoking, unhealthy diet, stress at home and work place, consumption of alcohol, sedentary life style, etc., are known to be risk factors for many such diseases. Long-term monitoring of all risk factors as well as the chronic disease conditions is essential, so that strong steps can be taken in order to live healthy life.

Background of Study

According to Project Proposal by The Central American Diabetes Initiative, Non Communicable Diseases threaten progress towards the nation. Poverty is closely linked with Non Communicable Diseases. The rapid rise in Non Communicable Diseases is predicted to impede poverty reduction initiatives in low-income countries, particularly by forcing up household costs associated with health care. Vulnerable and socially disadvantaged people get sicker and die sooner than people of higher social positions, especially because they are at greater risk of being exposed to harmful products, such as tobacco or unhealthy food, and have limited access to health services. Non-communicable diseases already disproportionately affect low- and middle-income countries where nearly 80% of NCD deaths – 29 million – occur. They are the leading causes of death in all regions except Africa.²

Rapid travel, mass migration and the globalization of culture are known to fuel the spread of infectious diseases. The same factors are also increasing the incidence of non-communicable diseases (NCDs) such as cancer, diabetes and heart disease. As developing countries prosper, these conditions are a by-product of rising air pollution, physical inactivity, and consumption of alcohol, tobacco and excess calories. In low-resource settings, health-care costs for cardiovascular diseases, cancers, diabetes or chronic lung diseases can quickly drain household resources, driving families into poverty. The exorbitant costs of NCDs, including often lengthy and expensive treatment and loss of breadwinners, are forcing millions of people into poverty annually, stifling development.³

Disease burden and economic development were significantly associated with development assistance for health, but many countries received considerably more or less aid than these indicators predicted. According to an article of 2014, the world has reached a population of 7.2 billion, with 138.8 million births and 54.9 million deaths taking place in 2013. Fertility rates are declining steadily almost everywhere, with the exception of sub-Saharan Africa, where rates are high and declining more slowly. By 2030, it is estimated that there will be 8.3 billion people on

this planet, with 13% over the age of 65 years—the fastest-growing age group and thus health care costs will rise even if disability rates decline.⁴

Mental illness and cardiovascular diseases are the largest problems. By disease, mental illness will account for the largest share of the economic burden in both 2010 and 2030, just slightly greater than cardiovascular diseases. They are followed by cancer, chronic respiratory disease and diabetes. First, in economic terms, NCDs matter significantly. At the national level, treatment expenses can be high and the loss of labour due to chronic disease can make a substantial dent in a country's productive capacity. Ongoing improvements in economic well-being can be seriously impeded by widespread chronic disease. Second, the human and economic burdens of NCDs can both be contained by devoting resources directly or indirectly to prevention, screening, treatment and care. In other words, health spending is not predominantly consumption. A large portion of health spending is appropriately viewed as investment – one that yields a handsome rate of return. It will be essential to involve a wide range of stakeholders in the implementation of interventions. The private sector, in particular, has a key role to play. For example, private industry can develop new technologies to prevent, diagnose and treat NCDs, market healthy products and make existing food products healthier. Also, setting priorities is a must, given that in most countries resources for health are very limited. For policy-makers, that will mean taking into consideration the current and projected burden of disease, cost-effectiveness of proposed interventions, the equity of and relative feasibility of competing options and short-term political considerations. Economic policy-makers are naturally concerned about economic growth but it would be illogical and irresponsible to care about economic growth and simultaneously ignore NCDs. Interventions in this area will undeniably be costly. But inaction is likely to be far more costly.⁵

Food and alcohol companies design and market unhealthy products with misleading labels. Despite peddling large quantities of sodium, sugar and trans-fats, junk-food companies have maneuvered their way into schools and hospitals. Yet Non Communicable Diseases are often framed as a problem of individual responsibility, with prevention policies criticized as paternalistic. The damage caused by Non Communicable Diseases goes well beyond individuals. These conditions should be reframed as a collective problem that requires a global response. To address the issue of aggressive marketing, some States have supported self regulation and have allowed food companies to voluntarily regulate their practices related to marketing and nutritional content of unhealthy foods to children. Companies often voluntarily adopt self-formulated guidelines and standards to restrict Government regulation and respond public demands. They have also taken joint initiatives and formulated guidelines for member companies to restrict advertising and promoting practices with respect to children. However, self-regulation by companies has not had any significant effect on altering food marketing strategies.⁶

Why the Non Communicable Diseases response needs health coverage:

According to The Lancet global health blog, Health coverage and Non-Communicable Diseases are high priorities in global health. The increasing burden of Non Communicable Diseases is widely recognized, but what's less widely understood is why health coverage is necessary for an effective Non Communicable Diseases response. To be clear, health coverage in itself won't be the answer to the Non Communicable Diseases epidemic. Non Communicable Diseases are uniquely responsive to social determinants of health: the circumstances and environments in which people live. These factors contribute heavily to risk factors like unhealthy diet, physical inactivity, and tobacco and alcohol use. In Nepal (one of the few countries for which data on Non Communicable Diseases spending is available) a meager 7% of the national health budget is devoted to Non Communicable Diseases, despite accounting for 60% of the disease burden, and donors haven't picked up the slack: only 1% of all development assistance for health went to Non Communicable Diseases in 2011.⁷

Contrary to common misconception, the greatest burden of Non Communicable Diseases —both in terms of health consequences and impoverishment—falls on the poor, and since a large and increasing share of the cost of Non Communicable Diseases care comes from out-of-pocket payments, Non Communicable Diseases are a prime cause of catastrophic health expenditures and reinforce societal inequities.

Diets high in intake of foods such as burgers, pizzas, red meats, crisps, biscuits, salty snacks, sugary drinks that contain high levels of sugar, salt, trans-fats and saturated fats are known to pose a greater risk for obesity and NCDs. Recognizing this large and growing problem, the country has set about providing a set of low-cost early screening and treatment services. These include assessments for risk factors like tobacco use and overweight; referrals for treatment of heart disease and high blood pressure; and inclusion of essential drugs for hypertension and diabetes.⁸

There is no silver bullet for Non Communicable Diseases. The many underlying causes (bad eating habits, lack of exercise, inadequate primary care infrastructure) will require the implementation of multifaceted, integrated initiatives in five key areas:

- Policy: shift the public health policy mindset toward a health/wellness-centered paradigm focused on preventing Non Communicable Diseases.
- Awareness: promote a healthy living concept that encourages healthy behavior, motivates patients to seek care early and adhere to prescribed therapies. India's effectiveness in treating Non Communicable Diseases is low of the estimated 38 million diabetics in urban India, for example, only about 30 per cent receive appropriate care with oral diabetes drugs or insulin.

- **Access:** providing universal access to quality healthcare—not just in the wealthier urban areas—will be an essential component of any Non Communicable Diseases solution. We need to expand prevention efforts and primary care availability and quality in both public and private sectors, as well as in urban and rural areas.
- **Affordability:** a key reason why those diagnosed with Non Communicable Diseases fail to seek treatment is their inability to afford it. There is a need for increased health insurance and expansion of coverage beyond hospital care. Insurance companies could reward healthy behavior, much as Apollo Munich's energy health insurance plan rewards policyholders (specifically diabetics) who keep their diabetes under control by offering discounts on premiums and cash backs that can be reimbursed for other medical expenses. Medical equipment companies can also provide creative solutions. Medtronic, inc., for example, helps thousands of Indians to access affordable cardiac treatment by providing non-collateral loans.
- **Technology/IT services:** firms in this sector can play an important role in tracking health conditions and information across caregivers to improve care delivery and ensure more effective monitoring. They can also use digital and mobile technology to engage patients and increase adherence.

Government's Pivotal Role

An article in business world talks about need of government to make prevention and treatment of Non Communicable Diseases a national priority and bring together stakeholders to develop holistic solutions. This can be achieved by:

- Defining a vision for and outlining a comprehensive Non Communicable Diseases strategy
- Rolling out public health initiatives that target behavioral risk factors
- Setting clear agendas and goals for collaborative multi-stakeholder action
- Ensuring that the needs of underserved areas and communities are addressed.⁹

According to *Global status report on Non Communicable Diseases*, Geneva, Switzerland: WHO; 2011, The prevalence of NCDs is predicted to cause almost three-quarters as many deaths as communicable, maternal, and nutritional diseases by 2020, and to exceed them as the most common causes of death by 2030 in Africa. The most common chronic NCDs reported globally include cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases.¹⁰

According to *Castellsague X, Munoz N, De Stefani E, Victoria CG, Castelletto R, Rolon PA, et al*, most of the behavioral risk factors are potentially modifiable ones. It was estimated that 4.83

million premature deaths in the world was attributed to smoking of which half of them are in developing countries and 3.84 million of these deaths were in men. It has been documented that regular smoking can increase the risk not only of NCD, but also of many other diseases. Imbalance in diet is responsible for over nutrition leading to obesity, which in turn is a risk factor for various diseases. Long use of alcohol may directly cause certain organic diseases, may contribute to the development of cirrhosis of the liver, cancer of the mouth, pharynx, esophagus and pancreas and result in increased risk of accidents and suicide. A history of simultaneous exposure to cigarette smoking and the habit of heavy alcohol intake revealed a very high risk for developing esophageal cancer, suggesting a synergistic interaction between the two.¹¹

According to *Rev Paul Pediatr* in a paper addressing the socioeconomic determinants of healthy eating and physical activity levels among adolescents, the prevalence of risk factors of chronic Non-Communicable Diseases (CNCD) has been studied in groups of adolescents so that health complications may be prevented in the short and long terms. The goals defined by the World Health Organization for 2008 to 2013 include the reduction of CNCD risk factors because these diseases account for up to 60% of global mortality, and this rate may reach 77% in the next decade.¹²

Observational studies showed that the exposure to behavioral and biological CNCD risk factors is associated with socioeconomic status. A study conducted with data retrieved from the US Youth Risk Behavior Survey found that smoking, excessive alcohol consumption and sedentary lifestyles were more prevalent among adolescents with a lower income or whose parents or guardians had little education, whereas the consumption of fat-rich foods was lower among adolescent girls whose parents had a higher level of education.

Socioeconomic factors play an important role in adolescent quality of life, health and lifestyle, but little is known about the association between socioeconomic status and CNCD risk factors. Moreover, it is important to investigate how risk factors combine and are distributed in different socioeconomic classes. Such data may support interventional strategies to reduce health problems among young individuals.¹³

Problem Statement:

1. How behavioral risk factors are distributed among socio-demographic categories?
2. What are the behaviors that contribute most to the non communicable disease?
3. What are the patterns of health insurance spending that exist today

Research Question:

1. What is the occurrence of behavioral risk factors?
2. To what extent socio-demographic and behavioral risk factors predict occurrence of Non Communicable Diseases in individuals?
3. What is pattern of health insurance in the individuals?

Objective of study:

1. To estimate the prevalence of various behavioral risk factors responsible for Non Communicable Diseases among individuals
2. To study the association of different types of risk factors with occurrence of non communicable diseases
3. To study the health insurance pattern of individuals

Methodology:

Study Design

The sample was representation of adults of middle income community in New Delhi. Using non probability sampling, descriptive study was done on families living in Delhi Development authorized middle income group (DDA MIG) flats.

Size Calculation

The target sample size was 150 persons of 25 years to 50 year of age. Sample included around 50% male and 50% Female individuals.

Sample Selection

Participants were selected on convenience which resulted in Non Probability Sampling in a community of Keshavpuram consisting ~5,000 middle income group houses/family

Inclusion Criteria:

1. Adults more than 25 years of age

25 year is the age when most of the middle class Indian adults complete their college and studies and become independent and start taking decisions for themselves.

Exclusion Criteria:

1. Men or women more than 50 years of age
2. Pregnant women

(To avoid the bias of pregnancy and old age related /originated pathophysiological conditions, abnormalities and co-morbidities, age group more than 50 years and pregnant women were not included in the study)

Data Collection Tools:

Data was collected by Structured Questionnaire which included questions on Behavioral Risk Factors, Present Status of Chronic Diseases, Health Insurance, Family history etc. The data analysis was done using statistical software SPSS16.0

Risk factors of non communicable diseases used in questionnaire are:

Behavioral risk factors: *Tobacco use, Diet habits, Physical activity*, Demographic factors: *age, gender, education, occupation*, Co-morbidity: *overweight, obesity, hypertension, hypotension, other*, Biochemical risk factors: *diabetes, Hypercholesterolemia*

Ethical Considerations

1. consent of participants was taken prior to survey
2. Data security was assured
3. Privacy and confidentiality of patient was assured

Research Findings

Demographics:

Out of 150 respondent 26 percent did not provided complete responses which resulted in total sample size 111. There were 56 female and 55 male respondents. The minimum age was 26 years and the maximum age was 45years. The mean age of respondents was 32.5 years

Table 1: Sample Demographics by Age

Age of respondent	N	Minimum age	Maximum age	Mean age	Median age	Mode age
	111	26	45	32.5	32	32

Table 2: Sample Demographics by Gender

Gender	Male	Female
Frequency	55	56

Smoking and chewing habits:

The survey indicated that the distribution of smoking habit was more in people of age between 26 to 35 years. The prevalence of smoking habit was highest i.e. (96%) among age group of 31 to 35 years. Females had habit of smoking comparatively lesser than men. A fraction of (94%) people of age group 31 to 35 years preferably males used other substances for chewing, mainly containing raw tobacco.

Fruit consumption:

Unhealthy diet is the major cause of non-communicable diseases. Report from the World Health Organization and the Food and Agriculture Organization recommend the sufficient amount of fruit and vegetable intake, per day. This survey calculated the habit of eating fruits on the basis of no of days. Majority of people (46%) included fruits in their diet for one to two days a week or once in two to three weeks. Survey found that (23%) of people of age 41 to 45 years were aware about having importance of fruits in their diet, and took fruits every day. Males were found to be more concerned about eating fruits.

Table 3: prevalence of behavioral risk factors by Age

		Age Category				Total	p value
		1 (26-30 yrs)	2 (31-35 yrs)	3 (36-40yrs)	4 (41-45 yrs)		
habit of smoking	No	0 0.00%	2 3.90%	3 37.50%	7 53.80%	12 10.80%	0.000
	Yes	39 100.00%	49 96.10%	5 62.50%	6 46.20%	99 89.20%	
habit of chewing tobacco	No	1 2.60%	3 5.90%	7 87.50%	6 46.20%	17 15.30%	0.000
	Yes	38 97.40%	48 94.10%	1 12.50%	7 53.80%	94 84.70%	
habit of eating fruit	Everyday	1 2.60%	0 0.00%	1 12.50%	3 23.10%	5 4.50%	0.001
	3 to 4 days a week	0 0.00%	1 2.00%	0 0.00%	1 7.70%	2 1.80%	
	1 to 2 days a week	0 0.00%	46 90.20%	2 25.00%	2 15.40%	50 45.00%	
	Once in 2 to 3 weeks	38 97.40%	4 7.80%	4 50.00%	5 38.50%	51 45.90%	
	Once in a month	0 0.00%	0 0.00%	1 12.50%	2 15.40%	3 2.70%	

Stress:

In the present study, proportion of males feeling mentally stressed occasionally was found to be (90%). Habit of taking stress was found to be more of occasionally for personal, professional, health or family problems. People of age group 26 to 35 year feel mentally stressed more than other age groups.

Table 4: Distribution of stress level by Age

		Age Category				Total	p value
		1 (26-30 yrs)	2 (31-35 yrs)	3 (36-40yrs)	4 (41-45 yrs)		
Stressed	Frequently	0 0.00%	3 5.90%	2 25.00%	7 53.80%	12 10.80%	0.001
	Occasionally	39 100.00%	47 92.20%	6 75.00%	4 30.80%	96 86.50%	
	Rarely	0 0.00%	1 2.00%	0 0.00%	2 15.40%	3 2.70%	

Physical Inactivity:

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Physical inactivity is an independent risk factor for chronic diseases, particularly cardiovascular disease, stroke, type II diabetes, colon cancer. There is also evidence to suggest that increasing levels of various types of physical activity may benefit health through positive effects on hypertension, osteoporosis and fall risk, body weight and composition, musculoskeletal conditions such as osteoarthritis and low back pain, mental and psychological health by reducing depression, anxiety and stress, control over risk behaviors particularly among children and young people (e.g. tobacco use, alcohol / substance use, unhealthy diet and violence).

The proportion of individuals of age group 26 to 30 years and 36 to 40 years were found to be physically inactive. (90%) people among age group 30 to 35 years had medium activity level with only 60 to 120 min of activity. (80.4%) Females were found to have low physical activity having sedentary lifestyle while (83.6%) males have medium activity level.

Exercise:

Daily routine is enough, and exercise is of not much importance in their routine was highly assumed thought (92.8%). Majority of males didn't included exercise in their schedule, where as females go for it occasionally.

Body mass index:

BMI was calculated by metric formula.

BMI	(Weight in Kilograms / (Height in Meters x Height in Meters))
BMI	(Weight in Pounds / (Height in inches x Height in inches)) x 703

BMI was calculated by the weight and height of respondents. If the responses were in different units they were converted to the desired unit. The conversion formulae for feet (ft) and inches (in) to meters (m) is simple. One foot is equivalent to 0.3048 meters and one inch equals to 0.0254 meters. Whereas, the centimeter is a unit of length in the metric system which is equal to one hundredth of a meter and one cm is equivalent to 0.39370 inches. Similarly one kilogram is equivalent to 2.20462 pound. ¹⁴

Overweight and obesity contribute to the development of numerous chronic diseases, including cardiovascular disease, diabetes, cancers, respiratory and musculoskeleton disorders. People with excess body fat are at higher risk of heart disease, even if they do not have other risk factors. Overweight and obesity are the result of unhealthy eating habits as well as a sedentary life style. Although the terms overweight and obesity are used interchangeably, overweight refer to an excess of body weight compared with height, while obesity referred to an excess of body fat. In

populations with high levels of adiposity, excess body fat, is highly correlated with body weight. Body mass index (BMI), a measurement of overweight and obesity, expresses the relationships between weight and height, is used to assess morbidity and mortality that is associated with excess body fat.

Majority of people had high BMI. The percentage of high BMI was (47.7%) among people, and Low BMI or issues of underweight were (38.7%).

(97.4%) of people of age group 26 to 30 years were underweight whereas (97%) people of age group 31 to 35 years were obese. High prevalence of overweight/ obesity was found among males (89.1%) which were much more than that of females i.e. (76.8%) females were found to be underweight.

Table 5: Distribution of Non communicable disease Risk Factors by Age

		Age Category				Total	p value
		1 (26-30 yrs)	2 (31-35 yrs)	3 (36-40yrs)	4 (41-45 yrs)		
exercise schedule	21 to 30 days in a month	0 0.00%	1 2.00%	1 12.50%	3 23.10%	5 4.50%	0.000
	11 to 20 days in a month	0 0.00%	0 0.00%	0 0.00%	2 15.40%	2 1.80%	
	1 to 10 days in a month	39 100.00%	50 98.00%	6 75.00%	8 61.50%	103 92.80%	
	Never	0 0.00%	0 0.00%	1 12.50%	0 0.00%	1 0.90%	
physical activity	Low	39 100.00%	5 9.80%	5 62.50%	4 30.80%	53 47.70%	0.000
	Medium	0 0.00%	46 90.20%	1 12.50%	4 30.80%	51 45.90%	
	High	0 0.00%	0 0.00%	2 25.00%	5 38.50%	7 6.30%	
BMI	Under weight	38 97.40%	2 3.90%	1 12.50%	2 15.40%	43 38.70%	0.000
	Normal	0 0.00%	1 2.00%	3 37.50%	5 38.50%	9 8.10%	
	Overweight	1 2.60%	1 2.00%	1 12.50%	3 23.10%	6 5.40%	
	Obese	0 0.00%	47 92.20%	3 37.50%	3 23.10%	53 47.70%	

(a) Effect of stress on BMI:

The BMI was significantly higher (69.8%) for people who took stress frequently or occasionally, and thus obesity was major problem. Sometime stress can also result in low BMI which was (20.8%) in the survey making people underweight.

(b) Effect of physical activity on BMI:

Significant number (67.6%) of people was having high BMI. (49.1%) of people who had sedentary lifestyle were obese whereas (37.7%) of people having sedentary lifestyle were underweight. Also (88.2%) people who had moderate physical activity routine were having High BMI. This result was significant which reflected that physical activity is necessary for keeping normal BMI, and inactive lifestyle can lead to obesity or underweight.

(c) Effect of exercise on BMI:

Significant number (60%) of people doing exercise daily were of normal weight i.e. normal BMI. 100% of people who occasionally or never do exercise were overweight, (69.9%) of people who thought their routine is enough and they don't need exercise were obese.

Table 6: Relationship of Stress Level and BMI

		body mass index				P value
		underweight	Normal	overweight	obese	
stressed	Frequently	1 8.30%	0 0.00%	3 25.00%	8 66.70%	0.005 at 95% CI
	occasionally	20 20.80%	7 7.30%	2 2.10%	67 69.80%	
	Rarely	0 0.00%	2 66.70%	1 33.30%	0 0.00%	
Total		21 18.90%	9 8.10%	6 5.40%	75 67.60%	

Table 5: Relationship of Exercise Schedule and BMI

		body mass index				P value
		underweight	normal	overweight	obese	
Exercise schedule	21 to 30 days in a month	0 0.00%	2 40.00%	0 0.00%	3 60.00%	0.000 at 95% CI
	11 to 20 days in a month	0 0.00%	0 0.00%	2 100.00%	0 0.00%	
	1 to 10 days in a month	21 20.40%	7 6.80%	3 2.90%	72 69.90%	
	Never	0 0.00%	0 0.00%	1 100.00%	0 0.00%	
Total		21 18.90%	9 8.10%	6 5.40%	75 67.60%	

Table 7: Relationship of Physical Inactiveness and BMI

		underweight	Normal	Overweight	obese	P value
physical activity	Low	20 37.70%	3 5.70%	4 7.50%	26 49.10%	0.000 at 95% CI
	Medium	0 0.00%	5 9.80%	1 2.00%	45 88.20%	
	High	1 14.30%	1 14.30%	1 14.30%	4 57.10%	
Total		21 18.90%	9 8.10%	6 5.40%	75 67.60%	

Diabetics:

In the survey (55 %) people had diabetics or their sugar level was not under control. (94.1%) of people of age group 31 to 35 years had diabetics. (69.2%) people of age group 41 to 45 years had diabetics. (92.7%) of males were found to have diabetics in the survey.

Hyper or Hypo cholesterol level:

(91%) people were not found with any of the issues of cholesterol imbalances.

Heart problems:

(91.9%) people were not found with any of the problem with their heart.

Bone Related Problem:

(52.2%) people had problems with their bone. (92.2%) people of age group 31 to 35 years were suffering from bone pain or other bone problems. The next higher proportion was

(61.9%) people of age group 41 to 45 years. Survey recorded that (90.9%) males had problem of bone, whereas proportion of females suffering from bone problem were comparatively less.

Hyper / Hypotension:

Hypertension is defined as a systolic blood pressure > 140 mm.Hg. Or diastolic blood pressure > 90 mm Hg. Hypertension is a major risk factor for cardiovascular disease. (94.6%) of people had abnormal Blood Pressure. Majority of people of age group 26 to 30 years had hyper/hypo blood pressures. Whereas survey recorded that (96.1%) people of age group 31 to 35 years had abnormal Blood Pressure.

Table 8: Distribution of Co-Morbidity by Age

		Age Category				Total	p value
		1 (26-30 yrs)	2 (31-35 yrs)	3 (36-40yrs)	4 (41-45 yrs)		
has diabetics	No	39 100.00%	3 5.90%	4 50.00%	4 30.80%	50 45.00%	0.000
	Yes	0 0.00%	48 94.10%	4 50.00%	9 69.20%	61 55.00%	
problem of cholesterol imbalances	No	39 100.00%	49 96.10%	5 62.50%	8 61.50%	101 91.00%	0.000
	Yes	0 0.00%	2 3.90%	3 37.50%	5 38.50%	10 9.00%	
problem with heart	No	39 100.00%	50 98.00%	6 75.00%	7 53.80%	102 91.90%	0.000
	Yes	0 0.00%	1 2.00%	2 25.00%	6 46.20%	9 8.10%	
bone related problem	No	39 100.00%	4 7.80%	5 62.50%	4 30.80%	52 46.80%	0.000
	Yes	0 0.00%	47 92.20%	3 37.50%	9 69.20%	59 53.20%	
hyper/hypo BP	No	0 0.00%	2 3.90%	1 12.50%	3 23.10%	6 5.40%	0.001
	Yes	39 100.00%	49 96.10%	7 87.50%	10 76.90%	105 94.60%	

Accessibility to health services:

Accessibility to health services is important to NCD and injuries prevention and control. It includes detection of illness through screening, treatment, and management of illness and injuries. Lack of access to health care may cause easily treatable problems to become major health problems for many people. To have health insurance gives people the possibility to access health care. Health insurance includes government and private insurance.

In answer to the question it was found that (50%) of people who did not had health insurance went into emergency ward in last 2 years. The percentage of going to hospital and having large out of expenditure was significantly higher i.e. (93.4%) for people who did not had health insurance.

Table 9: Distribution of Emergency Ward Admission among People Having Health Insurance

		visit to emergency ward in last 2 years		P value
		no	Yes	
has health insurance	No	53 50.00%	53 50.00%	p value > 0.005
	Yes	4 80.00%	1 20.00%	
Total		57 51.40%	54 48.60%	

Table 10: Distribution of hospitalization among people having health insurance

		Visit to hospital in last 2 years		P value
		no	Yes	
has health insurance	No	7 6.60%	99 93.40%	0.005 at 95% CI
	Yes	3 60.00%	2 40.00%	
Total		10 9.00%	101 91.00%	

Effect of family medical history:

1) Family medical history had diabetics:

Significant number of people was found to be suffering from diabetics (92.2%) who had this disease in their family history, while (4.8%) people did not had diabetics despite of the fact that their family medical history had diabetics.

2) Family medical history had problem of cholesterol imbalances:

Significant number (95%) of people was found to be with perfectly normal cholesterol level with no issues of heart problem.

3) Family medical history had heart problems:

Significant number (84.7%) of people was found to be with no heart problems that had heart problems in their family medical history.

Table 11: Relationship of Family Medical History and Morbidity

		has diabetics		P value
		No	Yes	
family history had diabetics	No	3 50.00%	3 50.00%	0.002 at 95% CI
	Yes	5 4.80%	100 95.20%	
Total		8 7.20%	103 92.80%	

Table 12: Relationship of Family Medical History and Morbidity

		has heart problems		P value
		No	Yes	
family history had cholesterol imbalance	No	6 60.00%	4 40.00%	0.002 at 95% CI
	Yes	96 95.00%	5 5.00%	
Total		102 91.90%	9 8.10%	

Table 13: Relationship of Family Medical History and Morbidity

		has heart problems		P value
		No	Yes	
family history had heart problems	No	52 100.00%	0 0.00%	0.002 at 95% CI
	Yes	50 84.70%	9 15.30%	
Total		102 91.90%	9 8.10%	

Evaluating Co-relations of Morbidity and Non Communicable Disease Risk Factors:

Odds Ratio

An odds ratio (OR) is a measure of association between an exposure and an outcome. The OR represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure.

Odds ratios are used to compare the relative odds of the occurrence of the outcome of interest (e.g. disease or disorder), given exposure to the variable of interest (e.g. health characteristic, aspect of medical history). The odds ratio can also be used to determine whether a particular exposure is a risk factor for a particular outcome, and to compare the magnitude of various risk factors for that outcome.

OR=1 Exposure does not affect odds of outcome

OR>1 Exposure associated with higher odds of outcome

OR<1 Exposure associated with lower odds of outcome

When,

- A= Number of exposed cases
- B= Number of exposed non cases
- C= Number of unexposed cases
- D= Number of unexposed non cases

Odds ratio (OR) = ad/bc

Results of co relation of morbidity and risk factors of non communicable disease are given in following tables

Table 14: Co-Relation of Diabetics and Risk Factors

	Diabetics		
		95%CI	
	OR	lower	Upper
Physical activity	Odds of developing diabetics is 6.533 times more for inactive people as compared to active	1.042	40.946
BMI	Odds of developing diabetics is 4.571 times more for people having abnormal BMI as compared to normal BMI	0.775	26.96

Table 15: Co-Relation of Cholesterol Imbalance and Risk Factors

	Cholesterol Imbalance		
		95%CI	
	OR	lower	Upper
Physical inactivity	Odds of developing cholesterol imbalance is 2.047 times more for inactive people as compared to active	0.366	11.434
BMI	Odds of developing cholesterol imbalance is 4.64 times more for people having abnormal BMI as compared to normal BMI	1.117	19.282

Table 16: Co-Relation of Heart Problem and Risk Factors

	Heart Problem		
		95%CI	
	OR	Lower	upper
Smoking	Odds of developing heart problem is 0.38 times more for smokers than non smokers	0.069	2.086
Chewing tobacco	Odds of developing heart problem is 0.603 times more for people eating tobacco than non eaters	0.114	3.187
Physical inactivity	Odds of developing heart problem is 0.180 times more for inactive people as compared to active	0.03	1.103
BMI	Odds of developing heart problem is .258 times more for people having abnormal BMI as compared to normal BMI	0.045	1.482

Table 17: Co-Relation of Bone Problem and Risk Factors

	Bone		
		95%CI	
	OR	Lower	upper
Physical Inactivity	Odds of developing bone problem is 5.611 times more for inactive people as compared to active	0.505	62.37

Table 18: Co-Relation of Irregularities of Blood Pressure and Risk Factors

	Blood Pressure		
		95%CI	
	OR	Lower	upper
Smoking	Odds of developing BP problem is 1.15 times more for smokers than non-smokers	0.322	4.113
Physical inactivity	Odds of developing BP problem is 0.900 times more for inactive people as compared to active	0.166	4.887
BMI	Odds of developing BP is 1.145 times more for people having abnormal BMI as compared to normal BMI	0.269	4.876

Discussion

The present study has revealed a substantially high rate of prevalence of some of the behavioural risk factors among adults in the community, especially the habit of smoking and chewing tobacco, eating habit etc. Smoking is considered to be a major risk factor for chronic illnesses since it is responsible for most of the lung cancer, the majority of chronic bronchitis, emphysema and a good portion of ischemic heart diseases in men.

The study further showed that the dietary habits of the majority of the respondents were not healthy. Change in eating habits -less fibre and more fatty food was influential for many chronic diseases in different countries. The relationship between the inadequate intakes of high -fibre foods such as vegetables and fruits, and the occurrence of chronic non communicable diseases is well documented. Adult should consume an adequate quantity of fruits and vegetables (at least two servings daily). The inadequate dietary pattern prevailing among the respondents in the present study is likely to impact adversely on the future morbidity burden in the community, especially in the absence of adequate physical activities observed. The inadequate consumption of fruits and vegetables, and inadequate physical activity or exercise is known to enhance disease propensity. Physical activities are of prime importance for lowering the levels of cholesterol and blood pressure

Some of the behavioural risk factors are potentially modifiable. Cardiovascular diseases, the leading cause of deaths in developed countries, were mainly caused by cigarette smoking, lack of physical activity, obesity, stress, hypertension, *etc.* The higher prevalence of such risk factors observed in the present study also suggest a high potential for acquiring high morbidity burden for non communicable diseases,

There is growing evidence that inactivity and a sedentary lifestyle are associated with increased risk of Non Communicable Diseases. Changes to labour-saving occupations, a high dependence on cars and buses for transportation, massive urbanization, propagated satellite television, and increased reliance on computers and telecommunication technology have all led to a more sedentary lifestyle and reduced energy expenditure. Therefore, leisure activities have changed from outdoor play to indoor entertainment. Physical activity and exercise was ignored factor among people which is alarming sign. People should know about the benefits of exercises and physical activity. They often ignore doing exercise and assume that their lifestyle is appropriate for keeping them fit. This is certainly a misconception which should be altered. People doing desk jobs are more prone for obesity and hence more attention must be given for healthy lifestyle.

Health benefits of physical activity are:

- Reduce the risk of coronary heart disease and stroke

- Reduce the risk of Type II diabetes and metabolic syndrome
- Reduce the risk of colon cancer and breast cancer among women.
- More physical activity provides greater health benefits and may be required for weight control
- Strengthening musculoskeletal function
- Improving mental health
- Improving ability to do daily activities and prevent falls in older adults
- Increasing the chances of longer life

People now days take stress easily. The reason can be personal, professional or family life but is not good. The study clearly described that people taking stress are more prone to imbalances in their BMI. Either they start eating too much or they start skipping the meals which lead them to condition of overweight or underweight.

A family medical history of both diabetes and heart problem were prevalent in both sexes, suggesting an underlying genetic predisposition in the population that possibly contributes to the high prevalence of these conditions. Genetic predisposition possibly contributes to the high prevalence of diabetes, hypertension. The information of health service utilization from the survey showed that most people reported they do not have health insurance and people had to pay expenditure for their health.

The odds ratio gives a clear description of association of risk factors with the diseases. Diabetic patient should give emphasis on physical activity as the chances of getting diabetics are more if inactivity is continued. Similarly BMI plays major role in keeping the heart problems away. Abnormal BMI i.e. higher or lesser than the normal range is a risk factor for heart problems. Physical inactivity increases the chances of Bone problems in the individuals. Smoking and abnormalities in BMI increases the risk of Blood pressure irregularities

Recommendations

There is a need to bring changes in the model of care to place emphasis on primary health care and prevention. Such programs must include widespread health education to address key lifestyle factors such as physical activity, nutrition, and tobacco use, which is sensitive to gender, age group, ethnicity, and geographic location. Alongside changes in the model of care, the development of human resources must be addressed.

An increase in physical activity must be promoted and supported through the provision of organized programs, parks, playgrounds, and the encouragement of more physical activity in

schools. Food based dietary guidelines should be taught from childhood so that a mentality of eating healthy foods and avoiding junk foods can be developed easily.

A high Body Mass Index (≥ 25.0), is the most consistent predictors of diabetes, hypertension and high cholesterol in both sexes. Total cholesterol was a strong predictor of diabetes and hypertension.

Healthy activities should be the easy choice where people live, learn, work and play. Bicycle lanes, bike-share programme, pavements, playgrounds, sports pitches and parks make physical activity safe and attractive. Investing in public transport reduces driving and air pollution. Schools and employers should dedicate time to recreation, offer healthy menus and make stairways more welcoming.

Global governance would facilitate these environments in several ways: by providing templates for redesigning public spaces, schools and workplaces; by offering technical assistance in architecture and city planning; and by creating incentives, such as competitive grants, to promote innovative city landscapes or food programmes. Such governance could promote information exchange, demonstrated by the heart-disease prevention programme in Finland, which included initiatives to increase physical activity and inspired similar prevention measures in other countries.

Future research should focus on characterizing the quality of care provided to patients with diabetes and hypertension, and the incidence of secondary and tertiary care outcomes.

Limitations

1. Around 26% of respondents did not provide complete responses for questionnaire.
2. The sampling was convenience sampling.
3. The sampling was done in municipal (MCD) authorized colonies inhabited by middle class and higher middle class families.

Conclusions

The rising burden of chronic Non Communicable Diseases affecting older people places a heavy burden on the health system as a result of increased demand and access to healthcare services.

In conclusion, in this community-based study, a high burden of Non Communicable Diseases risk factors was observed. Some interesting patterns of association of socio-demographic and behavioural risk factors with biochemical risk factors were seen. Intervention programs to prevent and control Non Communicable Diseases in our country are lacking. Most of the current programs are focusing on education through mass media, especially television, the press, and booklets. There is a need to establish a comprehensive strategy to include all the

Non Communicable Diseases rather than separate strategies for each disease, which is happening in many countries.

It is well documented that the risk factors for these diseases are related to each other, and that each disease may be a risk factor for another Non Communicable Diseases. In order to combat Non Communicable Diseases, we need to focus on practical solutions that can be applied to prevent and control these diseases and make better use of the most reliable research data. Programs used in such a strategy should be long-term and sustainable, and the proposed activities should include all segments of the community. Private sectors as well as governmental sectors should be involved in the preparation and implementation of such programs. Three main components should be promoted in this strategy, i.e. healthy eating, physical activity, and a healthy lifestyle, and avoidance of tobacco smoking.

References

1. World Health Organization, non communicable diseases fact sheet, accessed by <http://www.who.int/mediacentre/factsheets/fs355/en/> on 18th april,2015
2. PAHO/WHO. The Central American Diabetes Initiative (Belice, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama). Project Proposal, April 2002.
3. Lawrence O. Gostin, Non-communicable diseases: Healthy living needs global governance 9/7/2014 accessed by <http://www.nature.com/news/non-communicable-diseases-healthy-living-needs-global-governance-1.15510> on 18th april,2015
4. National Institute on Aging, “Why population aging matters: A global perspective” (National Institutes of Health and U.S. Department of State, publication no. 07-6134, 2007)
5. Bloom DE, Cafiero ET, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S, et al. The global economic burden of noncommunicable diseases. Geneva, Switzerland: World Economic Forum; 2011.
6. WHO, Marketing Food to Children: the Global Regulatory Environment (Geneva, 2004), p. 13.
7. The Lancet Global Health Blog accessed by <http://globalhealth.thelancet.com/2014/09/15/why-ncd-response-needs-universal-health-coverage> as accessed on 20th march 2015
8. M. Tokunaga et al., “Diets, nutrients and noncommunicable diseases”, The Open Nutraceuticals Journal , vol. 5 (2012), p. 152
9. <http://www.businessworld.in/news/economy/non-communicable-diseases-a-threat-to-india%e2%80%99s-economic-growth/1345879/page-1.html> as accessed on 20th march 2015
10. World Health Organization. Global status report on non communicable diseases. Geneva, Switzerland: WHO; 2011
11. Castellsague X, Munoz N, De Stefani E, Victoria CG, Castelletto R, Rolon PA, et al. Independent and joint effects of tobacco smoking and alcohol drinking on the risk Of oesophageal cancer in men and women. Int J Cancer 1999; 82 : 657-64.
12. Rev Paul Pediatr 2012;30 (3):338-45. World Health Organization. Addressing the socioeconomic determinants of healthy eating and physical activity levels among adolescents. Florence: WHO/ HBSC Forum; 2006
13. Plotnikoff RC, Karunamuni N, Spence JC, Storey K, Forbes L, Raine K et al. Chronic disease-related lifestyle risk factors in a sample of Canadian adolescents. J Adolesc Health 2009
14. BMI calculation http://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.html as accessed on 18th april,2015
15. Communicable Diseases and Health Indices of Adolescents <http://www.academia.edu/8828958/Non> as accessed on 10th april,2015
16. Yuqiu Li 2011, Tshwane University Of Technology 2011, Packaging Multiple Interventions In A Wellness Clinic To Promote Cardiovascular Wellness In Soshanguve

Annexure

QUESTIONNAIRE

Q1. Name: Place of residence:

Q2. Your age:

Q3. Gender: male..... Female.....

Q5. (Family history): Have any of your family members suffered from or are suffering from the following conditions?

1. Diabetes 1.yes 2.No
2. Cancer 1.yes 2.No
3. High Cholesterol 1.yes 2. No
4. Osteoporosis/ Bone related problem 1. Yes 2. No
5. Heart problem 1. Yes 2. No
6. Any other 1.yes 2. No
7. None of the above 1.yes 2.no

Q6. Do you smoke any products such as cigarettes, cigar etc.?

1. Yes.... 2. No....

Q7. Do you use any smokeless products such as chewing tobacco etc?

1. Yes 2.No

Q9. How frequently do you eat fruit? (tick mark the appropriate option)

- 1) everyday
- 2) 5 to 6 days in a week
- 3) 3 to 4 days in a week
- 4) 1 to 2 days in a week
- 5) Once in 2 -3 weeks
- 6) Once in month
- 7) Never

Q11. Physical activity

A. What is the level of your physical activity?

Physical activity examples are carrying heavy loads, digging, construction, continuous walking or simple walking which involves your hand and leg movement and makes you tired.

- 1) Low (avg. <60 min/week)
- 2) Medium (avg. = 60-149 min/week)
- 3) High (avg. >= 150 min/week)

B. How much do you exercise?

- 1) 21 to 30 days in a month
- 2) 11 to 20 days in a month
- 3) 1 to 10 days in a month
- 4) Never

Q12. How often you feel mentally stressed?

(Stress is a person feeling mentally drained, feeling of things going out of control, not able to manage personal and/or professional life)

1. Frequently
2. Occasionally
3. Rarely

Q13. Height (in meters)..... Weight (in kg)

BMI:

Categories: Underweight = <18.5, Normal weight = 18.5–24.9, Overweight = 25–29.9, Obesity = BMI of 30 or greater

Q15. Have you ever suffered from any of the following conditions?

1. Diabetics 1. Yes... 2. No....
2. Higher / Lower cholesterol level 1.Yes.... 2. No....
3. Heart diseases 1. Yes.... 2. No.....
4. Arthritis/bone related problems 1. Yes.... 2.No....
5. Other problem
6. None of the above 1.Yes.... 2.No.....

Q16. From January 2011 to January 2015, did you have uninterrupted Health and medical Insurance which covers your hospitalization and domiciliary medical expenses?

1. YES 2.NO

Q17. From January 2011 to January 2015 have you availed Emergency medical services?

1. Yes 2. No

Q18. From January 2011 to January 2015 have you availed OPD services?

1. Yes... 2.No.....