Original Article

Prevalence of Risk Factors for Chronic Non-communicable Diseases Using WHO Steps Approach in an Adult Population in Delhi

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Abstract

Objective: The burden of non-communicable diseases (NCDs) is increasing worldwide largely due to prevalence of various risk factors, which can be controlled. Therefore, the present study was undertaken to measure the prevalence of major preventable risk factors for chronic non-communicable diseases in an urban resettlement colony of Delhi, using STEPS approach. **Materials and Methods:** A cross-sectional study, that included a random sample of 200 adults, was conducted. A study tool based on the WHO STEPS questionnaire for assessing non-communicable diseases and their risk factors was used. Fasting venous blood sample was collected to assess the lipid profile and fasting blood sugar. Anthropometric measurements of the participants were also taken. Data was analyzed using SPSS version 17. **Results:** Out of the 200 participants, 26% (n = 52) were consuming alcohol and 17% (n = 34) were smoking. Majority (77.5%) had a raised waist circumference, and more than two-thirds were either overweight or obese. Fasting blood sugar levels were found to be raised in 18% of the study population. More than third participants had raised systolic and diastolic blood pressures and abnormal lipid profiles. More males were found to be overweight in comparison to females ($P < 0.01$), but in contrast, obesity ($P < 0.05$) and raised waist circumference ($P < 0.001$) were more common in females. Tobacco use was more common in lower class ($P < 0.05$), whereas obesity was commoner in the upper socio-economic class ($P < 0.05$). **Conclusions:** Study showed a high burden of risk factors for NCDs in the study population, pointing towards changing disease epidemiology of non-communicable diseases in India.

Keywords: Alcohol use, Delhi, non-communicable diseases, risk factors, tobacco use, WHO step approach

Introduction

Burden of non-communicable diseases (NCDs) like cardio-vascular and cerebro-vascular diseases, diabetes, hypertension and cancers has been increasing in India. According to World Health organization (WHO), NCDs accounted for about 53% of deaths and 44% of disability adjusted life years lost in 2004,[1] and it is predicted that it will be responsible for almost three quarters of all deaths in India by 2030.[2] This emergence of NCDs is largely due to rise in the prevalence of various risk factors following social and economic development. Risk factors such as tobacco use, physical inactivity, inappropriate diet (rich in fats and low in fruits and vegetables), dyslipidemia, obesity, and alcohol consumption have been implicated in occurrence of these chronic diseases.[1,3,4]

Evidence suggests that a large proportion of cases suffering from chronic disease can be prevented if their risk factors are controlled.[5,6] These risk factors are measurable and largely modifiable, and thus continuing surveillance of the levels of risk factors is of fundamental importance in NCD control.[7] The WHO has recommended surveillance of common NCD risk factors with the "STEPS" approach, using standardized instruments and protocols for collecting, analyzing, and monitoring trends for risk factors within and across countries.[8]

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Very few studies have assessed the NCD risk factors comprehensively amongst the Indian population using standard methodology.[7,9] Therefore, the present study was undertaken with the objective to measure the prevalence of major preventable risk factors for chronic non-communicable diseases and their association with socio-demographic characteristic of the adult population in an urban resettlement colony of Delhi, using STEPS approach.

Materials and Methods

Study setting and participants

This was a cross-sectional community-based study carried out in urban field practice areas of a Medical College in central district of Delhi from August 2011 to January 2012. The study area is a resettlement colony having 394 households and a total population of 1875 with 1350 individuals (72%) who are 18 years and above of age. Persons who were residing in the study area for more than 6 months and gave their voluntary consent to participate were included in the study. Critically ill patients, pregnant women, and patients with ascites, not consented or not available even after three visits, were excluded from the study.

Sample size and sampling

A population-adjusted sample size of 207 was calculated using current prevalence rates of NCDs in Delhi (10-30%), with precision of 5% and 95% confidence intervals.[10] Systematic random sampling at the household level[11] was used to select the participants. Finally, 200 subjects consented to participate.

Study tool

A structured questionnaire based on the WHO STEPS questionnaire was used.[12] (The validation of study tool has been described elsewhere).[11]

Definitions of variables

Hypertension,[13] overweight and obesity,[14] waist circumference,[15] waist hip ratio,[15] diabetes mellitus,[16] lipid disorders,[17] other variables like current smoker / smokeless tobacco user,[11] current daily smoker / smokeless tobacco user,[11] past smokers,[11] current alcohol consumption, excessive alcohol consumption,[18] one serving of vegetable and one serving of fruit,[19] and insufficient physical[20] activity were defined after through literature review and reference to standard guidelines. (The detailed definitions are published elsewhere).[11]

Study methodology

A medical team comprising of 3 physicians, 1 research officer, and 2 field volunteers was trained in data collection. Two members of the team visited a sampled household on the first visit. The purpose and methodology of the study was explained in detail to the members eligible for the study. Their particulars and consent for participating in the study were recorded on that visit. The participants were then asked to remain fasting for at least 8 hours the following morning with instructions prior to sampling. A second visit to the households was made on the consecutive morning of the first visit between 7 and 9 am. After confirming that, the study participants were fasting overnight for at least 8 hours; their blood pressure was recorded using a sphygmomanometer in the sitting position with validated procedure. The mean of the two readings was considered. Anthropometric measurements like the height, weight, and waist circumference of the participants were taken using validated procedures.[21] Following this, the participants were interviewed using the study questionnaire.

Biochemical samples were taken and analyzed using standard protocol.[22-26] The study participants were handed over the reports of blood sugar and lipid profile during the third home visit and were counseled for lifestyle and nutrition modification accordingly along with advice regarding further investigations and treatment if required.

Statistical analysis

Data was entered into MS excel and analyzed using the SPSS version 17. Descriptive analysis was done in the form of mean and standard deviations or proportions wherever appropriate. Statistical difference between means was calculated using the independent t test. Chi-square test was used to analyze the difference between proportions. *P* value of less than 0.05 was considered statistically significant.

Ethical considerations

The study subjects were explained the purpose of the study, and informed consent was taken. Complete privacy and confidentiality of participation was assured. The study was approved by the institutional ethics committee, and participants were provided appropriate advice, treatment, and referral wherever required.

Results

Out of the 200 participants, majority were Hindus (79.5%) and were married (86%), and more than half (55.5%) were females. The mean age of the study population was 45.48 ± 14.7 years (male respondents: 45.2 ± 16.2 years; female respondents: 45.7 ± 13.4 years, $P = 0.81$) with due representation of participants from all the age groups. Half the participants had received education only till primary level or less, while only 1 in 4 participants was a graduate. Majority of the females were housewives (66.7%), while males were involved in diverse nature of work. Half the participants belonged to lower socio-economic status [Table 1].

About one-fourth of the study participants consumed alcohol, and nearly 17% were smoking. The mean age of initiation of smoking among current smokers was 19.0 ± 3.6 years with 1 in 4 smokers smoking more than 1 pack of cigarette per day and 1 in 4 alcohol consumers drinking excessively. A large proportion of participants used refined oil (2/3rd) and mustard oil (1/3rd) as the cooking medium with a third of population using a

Table 1: Socio-demographic characteristics of study population (*n* = 200)

Socioeconomic characteristic	Total (%) *N* = 200	Male (%) *N* = 89	Female (%) *N* = 111	*P* value
Age (yr)				
18-30	35 (17.5)	18 (20.2)	17 (15.3)	
31-40	49 (24.5)	25 (28.0)	24 (21.6)	
41-50	41 (20.5)	12 (13.4)	29 (26.1)	
51-60	42 (21)	16 (17.9)	26 (23.4)	0.11
≥61	33 (16.5)	18 (20.2)	15 (13.5)	
Education$				
No schooling	34 (17)	7 (7.8)	27 (24.3)	
Less than 5th class	11 (5.5)	3 (3.4)	8 (7.2)	
Up to 5th class	42 (21)	19 (21.3)	23 (20.7)	
10th class	41 (20.5)	25 (28.0)	16 (14.4)	
12th class	19 (9.5)	11 (12.3)	8 (7.2)	
Graduation	39 (19.5)	16 (17.9)	23 (20.7)	
Post Graduate	14 (7)	8 (9)	6 (5.4)	0.002*
Occupation$				
Unemployed/ Housewives	107 (53.5)	20 (22.4)	87 (78.4)	
Unskilled	19 (9.5)	10 (11.2)	9 (8.1)	
Semi-skilled	13 (6.5)	8 (9)	5 (4.5)	
Skilled	14 (7)	12 (13.4)	2 (1.8)	
Clerical/Shop owner	42 (21)	36 (40.4)	6 (5.4)	
Semi-professional	5 (2.5)	3 (3.4)	2 (1.8)	< 0.001*
Religion				
Hindu	159 (79.5)	68 (76.4)	91 (81.9)	
Sikhism	16 (8)	7 (7.9)	9 (8.1)	
Muslim	25 (12.5)	14 (15.7)	11 (9.9)	0.46
Socioeconomic Status				
Upper	19 (9.5)	9 (10.1)	10 (9)	
Upper Middle	30 (15)	15 (16.8)	15 (13.5)	
Lower Middle	52 (26)	25 (28.0)	27 (24.3)	
Upper Lower	72 (36)	29 (32.5)	43 (38.7)	
Lower	27 (13.5)	11 (12.3)	16 (14.4)	0.84
Marriage$				
Married/live in	172 (86)	75 (84.2)	97 (87.3)	
Unmarried	20 (10)	14 (15.7)	6 (5.4)	
Widowed	8 (4)	0 (0)	8 (7.2)	0.53

$ Chi-square has been applied in literate vs. illiterate, employed vs. unemployed and married vs. unmarried/ widow; **P* value < 0.05

combination of different oils. Majority of the participants did not take the recommended 5 servings of fruits and vegetables per day and were not involved in any moderate / heavy physical activity [Table 2].

Majority (77.5%) had a raised waist circumference, and more than two-thirds were either overweight or obese. More than third participants had raised systolic and diastolic blood pressures and abnormal lipid profiles with raised total cholesterol, LDL cholesterol and triglycerides, and low HDL cholesterol. Fasting blood sugar levels were found to be raised in 18% of the study population [Table 2].

Both tobacco smoking and alcohol drinking were significantly more common in males as compared to females ($P < 0.001$). More males were found to be overweight in comparison to females ($P < 0.01$), but in contrast, obesity ($P < 0.05$) and raised waist circumference ($P < 0.001$) were significantly more common in females. The mean BMI among males and females was 24.9 ± 3.9 and 27.3 ± 5.7 respectively, ($P < 0.001$). There was no significant difference in the systolic blood pressure and pattern of lipid profile between males and females, but diastolic blood pressure (DBP) was significantly higher in males [mean DBP: 87.3 ± 12.5 in males vs. 83.2 ± 10.5 in females, $P < 0.05$] [Table 2].

After 40, there was a significant increase in number of participants with an increased waist circumference ($P < 0.001$) and raised systolic blood pressures ($P < 0.05$). This group also had significantly raised total cholesterol ($P < 0.001$), LDL cholesterol ($P < 0.001$), and triglycerides ($P < 0.05$) than younger (≤ 40 years) participants [Table 3]. With respect to the risk factor distribution according to socio-economic class, tobacco use was significantly more common in lower class ($P < 0.05$), whereas obesity was commoner in the upper socio-economic class ($P < 0.05$). No such difference was seen with respect to the other NCD risk factors [Table 4].

Assessment of compliance to treatment, of the already diagnosed patients, showed that 58.3% hypertensives and 82.1% diabetics were taking medicines regularly. Although 76.2% hypertensive reported restricted use of salt and 75% diabetics reported changes in the diet, only few hypertensives (36.1%) or diabetics (46.2%) exercised regularly and tried to lose weight (7% and 9.5% respectively). Most of the hypertensives and diabetics preferred the allopathic system of medicine, with few 4.5% and 6.5%, respectively, having tried the alternative systems of medicine.

Discussion

In present study, one-fourth of the participants were currently drinking alcohol regularly and about the same number consumed tobacco in some form. Around 30% alcohol consumers were drinking excessively and a fourth of smokers were smoking heavily, with all of them being males. The issue of tobacco and alcohol consumption in similar settings has been highlighted earlier as well.[9,19,27] In view of the recent evidence, moderate alcohol consumption is not beneficial to cardiac health[28] and tobacco use in any form and amount is associated with harmful health effects.[29] Also, excess alcohol consumption is associated with a high mortality from all causes and cardiovascular disease, including sudden death and hemorrhagic stroke apart from other problems.[30] This necessitates abstinence from these harmful substances.

Physical inactivity is the fourth leading risk factor for global mortality and has major implications on the NCDs, particularly cardiovascular diseases and the general health. However, despite the availability of plenty open spaces and parks in the vicinity, majority participants (both males and females) in the current study didn't exercise or indulge in sporting activities. The issue of physical inactivity has been highlighted in earlier studies.[19,27] Owing to reduction in cardiovascular risk and mortality in both

Table 2: Profile of the reported behavioral, anthropometric, and biochemical risk factors among the study subjects (*n* = 200)

Characteristics	Total *N* = 200 (%)	Male *N* = 89 (%)	Female *N* = 111 (%)	*P* value
Daily tobacco smokers	27 (13.5)	22 (24.7)	5 (4.5)	0.001
Moderate to heavy smokers	7 (3.5)	7 (7.9)	0 (0)	0.003
Daily smokeless tobacco consumption	24 (12)	15 (16.8)	9 (8.1)	0.05
Current alcohol consumption	52 (26)	49 (55)	3 (2.7)	0.001
Excessive alcohol consumption	14 (7)	14 (15.7)	0 (0)	0.001
Fruits and vegetables intake				
<5 servings per day	189 (94.5)	84 (94.4)	105 (94.6)	0.94
<3 servings/day	68 (34)	26 (29.2)	42 (37.8)	0.20
Subjects reporting physical inactivity				
Not doing Mod/heavy physical activity	160 (80)	69 (77.5)	91 (82.0)	0.43
Proportion with BMI				
23-24.9	36 (18)	24 (27)	12 (10.8)	0.01
≥25	109 (54.5)	41 (46)	68 (61.3)	0.03
Increased Waist Circumference (Men≥90 cm; Women≥80 cm)	155 (77.5)	54 (60.7)	101 (91)	0.001
Raised Systolic Blood Pressure				
140-159 mm Hg	41 (20.5)	20 (22.5)	21 (18.9)	0.53
≥160 mm Hg	24 (12)	10 (11.2)	14 (12.6)	0.76
Raised Diastolic Blood Pressure				
90-99 mm Hg	47 (23.5)	20 (22.5)	27 (24.3)	0.75
≥100 mm Hg	29 (14.5)	19 (21.3)	10 (9)	0.01
Proportion with fasting blood sugar≥126 mg/dl, *n*, (%)	36 (18)	14 (15.7)	22 (19.8)	0.45
Proportion with raised total cholesterol≥200 mg/dl, *n* (%)	68 (34)	27 (30.3)	41 (36.9)	0.32
Proportion with raised LDL cholesterol≥130 mg/dl, *n* (%)	80 (40)	35 (39.3)	45 (40.5)	0.86
Proportion with raised triglycerides≥150 mg/dl, *n* (%)	81 (40.5)	37 (41.6)	44 (39.6)	0.78
Proportion with low HDL cholesterol < 40 mg/dl, *n* (%)	75 (37.5)	37 (41.6)	38 (34.2)	0.28

Table 3: Age-wise distribution of the risk factors among the study population

Characteristics	18-30 yrs. *N* = 35	31-40 yrs. *N* = 49	41-50 yrs. *N* = 41	51-60 yrs. *N* = 42	≥ 61 yrs. *N* = 33	*P* value
Daily tobacco smokers	3 (8.6)	9 (18.4)	4 (9.7)	6 (14.3)	5 (15.1)	.78
Moderate to heavy smokers	1 (2.8)	2 (4.1)	1 (2.4)	2 (4.8)	1 (3)	.96
Daily smokeless tobacco consumption	6 (17.1)	10 (20.4)	5 (12.2)	1 (2.4)	2 (6.1)	.009
Current alcohol consumption	6 (17.1)	17 (34.7)	10 (24.4)	12 (28.6)	7 (21.2)	.70
Excess alcohol Consumption	0 (0)	6 (12.2)	5 (12.2)	1 (2.4)	2 (6.1)	.94
Fruits and vegetables intake						
<5 servings per day	29 (82.8)	48 (97.9)	40 (97.6)	40 (95.2)	32 (97)	.13
<3 servings/day	6 (17.1)	20 (40.8)	14 (34.1)	15 (35.7)	13 (39.4)	.43
Physical inactivity						
Not doing Mod/heavy physical activity	25 (71.4)	37 (75.5)	33 (80.5)	35 (83.3)	30 (90.1)	.06
Proportion with raised BMI						
23-24.9	6 (17.1)	11 (22.4)	8 (19.5)	5 (11.9)	6 (18.2)	.48
≥25	13 (37.1)	27 (55.1)	24 (58.5)	29 (69)	16 (48.5)	.09
Increased WC						
Male≥90 cm; Female≥80 cm	20 (57.1)	35 (71.4)	35 (85.4)	38 (90.5)	27 (81.8)	.001
Raised SBP						
140-159 mm Hg	3 (8.6)	8 (16.3)	4 (9.7)	11 (26.2)	15 (45.4)	.02
≥160 mm Hg	1 (2.8)	1 (2)	4 (9.7)	10 (23.8)	8 (24.2)	.001
Raised DBP						
90-99 mm Hg	6 (17.1)	8 (16.3)	10 (24.4)	12 (28.6)	11 (33.3)	.05
≥100 mm Hg	2 (5.7)	8 (16.3)	5 (12.2)	10 (23.8)	4 (12.1)	.37
Proportion with fasting blood sugar≥126 mg/dl, *n*, (%)	3 (8.6)	7 (14.3)	10 (24.4)	11 (26.2)	5 (15.1)	.05
Proportion with raised total cholesterol≥200 mg/dl, *n* (%)	2 (5.7)	14 (28.6)	12 (29.3)	21 (50)	19 (57.6)	.001
Proportion with raised LDL cholesterol≥130 mg/dl, *n* (%)	7 (20)	14 (28.6)	14 (34.1)	23 (54.8)	22 (66.7)	.001
Proportion with raised TG≥150 mg/dl, *n* (%)	7 (20)	20 (40.8)	18 (43.9)	21 (50)	15 (45.4)	.04
Proportion with low HDL cholesterol<40 mg/dl, *n* (%)	18 (51.4)	20 (40.8)	16 (39)	14 (33.3)	7 (21.2)	.05

Comparison was done between participants aged up to 40 and those above 40; $df = 1$; *P* values were calculated by applying the χ^2 test

Table 4: Distribution of the risk factors according to the socio-economic status

Characteristics	Upper *N* = 19 (%)	Upper Middle *N* = 30 (%)	Lower Middle *N* = 52 (%)	Upper Lower *N* = 72 (%)	Lower *N* = 27 (%)
Daily tobacco smokers*	0 (0.0)	4 (13.3)	4 (7.7)	15 (20.8)	4 (14.8)
Moderate to heavy smokers	0 (0.0)	2 (6.7)	1 (1.9)	4 (5.5)	0 (0.0)
Daily smokeless tobacco consumption*	0 (0.0)	2 (6.7)	3 (5.8)	15 (20.8)	4 (14.8)
Current alcohol consumption	7 (36.8)	11 (36.7)	14 (26.9)	16 (22.2)	4 (14.8)
Excessive alcohol Consumption	1 (5.3)	2 (6.7)	4 (7.7)	5 (6.9)	2 (7.4)
Fruits and vegetables intake					
<5 servings per day	16 (84.2)	28 (93.3)	50 (96.1)	70 (97.2)	25 (92.3)
<3 servings / day	5 (26.3)	14 (46.7)	13 (25.0)	29 (40.3)	7 (25.9)
Subjects reporting physical inactivity					
Not doing Mod / heavy physical activity	17 (89.5)	21 (70.0)	43 (82.7)	56 (77.8)	23 (85.2)
Proportion with BMI					
23-24.9	2 (10.5)	4 (13.3)	10 (19.2)	16 (22.2)	4 (14.8)
≥25*	14 (73.7)	19 (63.3)	30 (57.7)	34 (47.2)	12 (44.4)
Increased Waist Circumference (Men ≥ 90 cm; Women ≥ 80 cm)	17 (89.5)	24 (80.0)	42 (80.8)	53 (73.6)	19 (70.4)
Raised Systolic Blood Pressure					
140-159 mm Hg	3 (15.8)	10 (33.3)	13 (25)	12 (16.7)	3 (11.1)
≥160 mm Hg	5 (26.3)	3 (10)	6 (11.5)	7 (9.7)	3 (11.1)
Raised Diastolic Blood Pressure					
90-99 mm Hg	5 (26.3)	5 (16.7)	13 (25)	21 (29.2)	3 (11.1)
≥100 mm Hg	4 (21.0)	7 (23.3)	6 (11.5)	9 (12.5)	3 (11.1)
Proportion with fasting blood sugar≥126 mg/dl, *n*, (%)	3 (15.8)	7 (23.3)	8 (15.4)	12 (16.7)	6 (22.2)
Proportion with raised total cholesterol≥200 mg/dl, *n* (%)	10 (52.6)	6 (20.0)	18 (34.6)	25 (34.7)	9 (33.3)
Proportion with raised LDL cholesterol≥130 mg/dl, *n* (%)	13 (68.4)	11 (36.7)	22 (42.3)	24 (33.3)	10 (37.0)
Proportion with raised triglycerides≥150 mg/dl, *n* (%)	12 (63.1)	11 (36.7)	19 (36.5)	29 (40.3)	10 (37.0)
Proportion with low HDL cholesterol<40 mg/dl, *n* (%)	6 (31.6)	14 (46.7)	19 (36.5)	26 (36.1)	10 (37.0)

Comparison was done between participants belonging to upper and middle Vs lower SES, $df = 1$; P values were calculated by applying the χ^2 test (* = $P < 0.05$)

males and females of all age groups, there is need to sensitize and actively promote physical activity in the current study population.

It is found that majority of the study population used refined oil and mustard oil as a cooking medium. Preference of oil over ghee or vanaspati has been reported from earlier studies in similar settings.[9,27] This is a good practice as these oils contain significant levels of poly unsaturated fatty acids, which help to lower total cholesterol, LDL cholesterol, and triglyceride concentrations and are protective against coronary artery disease.[30] However, the fruit and vegetable intake in present study population was well below the WHO recommended intake of at least 400 grams (or 5 servings) per day.[30] Poor fruit and vegetable intake have been observed in other population-based studies,[9,19,27,31] and necessitates measures to create awareness with regard to their importance in maintaining good health.

Gender differences in distribution of some risk factors for NCDs have already been reported.[9,19,21,31] In present study, more females had abnormal lipid profile and fasting blood sugar levels than males, although the difference was not statistically significant. Also, females had a significantly higher BMI and waist circumference even though males had a higher diastolic blood pressure. Overall, it is found that the risk factors for NCDs were also widely prevalent in women, which indicates their susceptibility to NCDs and warrants gender-sensitive strategies specifically targeting women.

Many NCDs risk factors were seen to increase with age of the population in the current study. It is found that there was a significant increase in participants with raised waist circumference and systolic blood pressure and abnormal lipid profiles after the age of 40 years; however, many risk factors for NCDs were seen even in younger age groups. Although obesity was less among participants in the lower socio-economic groups, the other risk factors were distributed across all socio-economic groups. This indicates that once regarded as diseases of the affluent, NCD risk factors now burden even poorer and younger population and puts them at risk of chronic diseases.[32]

According to estimates, treatment of raised blood pressure is associated with a 35-40% reduction in the risk of stroke and at least a 16% reduction in the risk of myocardial infarction. Similarly, appropriate management of diabetes is associated with reduction in the risk of cardiovascular events.[30,33] However, as in earlier studies,[9,27] it is found that there was poor compliance to lifestyle modifications among many participants suffering from hypertension and diabetes. This constitutes a missed opportunity and needs to be addressed.

Conclusion

The current study showed a high burden of risk factors for non-communicable diseases in a resettlement colony in Delhi, pointing towards changing disease epidemiology of NCDs.

These risk factors were found to be prevalent in both males and females, across all socio-economic classes and even in younger age groups. Interventions like reducing body weight, blood pressure, blood cholesterol, and blood glucose all have a beneficial impact on major biological cardiovascular risk factors. Also, abstinence from smoking, well-balanced diet, mental well-being, regular exercise has been demonstrated to be beneficial to cardiovascular health. These health behaviors also play an etiological role in other NCDs like cancer, respiratory disease, diabetes, osteoporosis, and liver disease, which makes it very cost-effective to promote these interventions.[30] The National Program for Prevention and Control of Diabetes, Cardiovascular disease and Stroke has been launched focusing on disease prevention among high-risk population and health promotion among general population. Considering the burden of NCDs risk factors in the population, there is urgent need to work out community-based interventions at different levels including health promotion, prevention, early diagnosis, treatment, and rehabilitation. The challenge is to prevent acquisition of harmful health behaviors during the course of socio-economic development, especially among the younger populations. NCD control strategy also needs to address urbanization and warrants gender-sensitive strategies specifically targeting women.

Limitations

Though the study provides reliable information, there may be some limitations. The study was done in an urban resettlement area in Central Delhi, and the results cannot be generalized to other populations. As the behavioral risk factors were studied through self-reporting, some of the information may be concealed. In spite of these limitations, the study indicates that this segment of population is also vulnerable to NCDs.

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