Prevalence and Risk Factors for Non-communicable Diseases among Women in an Urban area Meerut (UP) A-Review

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Abstract
Background: *Non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes, chronic respiratory diseases, and cancers are leading causes of morbidity and mortality worldwide. In India, particularly in urban areas like Meerut, Uttar Pradesh, the prevalence of NCDs among women is a growing concern. This review paper aims to synthesize current research on the prevalence and risk factors for NCDs among women in this region. The thrust of non communicable diseases (NCDs) and their risk factors among the under privileged women of the urban areas are expected to increase. The objective of the study was to estimate the prevalence and socio demographic predictors of these risk factors. Materials and Methods: A cross sectional study was conducted among 360 women between 25 and 64 years in an urbanized village near Meerut India.*

Risk factors for NCDs were assessed using the WHOSTEPS instrument. To determine the socio demographic predictors of these risk factors binary logistic regression was used. Results: The prevalence of tobacco consumption, physical inactivity, and insufficient fruit and vegetable intake, overweight, and obesity was found to be 18.3%, 61.6%, 96.5%, 27.6%, and 5.9%, respectively. Raised blood pressure, blood glucose, and cholesterol were found to be present in 23%, 22%, and 42%, respectively. Older age was found to be a significant predictor of tobacco consumption, physical inactivity, raised blood pressure, and raised blood glucose.

Conclusion: *This review highlights the urgent need for targeted public health interventions to address the growing burden of NCDs among women in urban Meerut. Improving lifestyle choices, enhancing healthcare access, and implementing effective health policies can significantly reduce the prevalence of these diseases and improve the quality of life for women in this region. Recent study reported a high prevalence of physical in activity and insufficient fruit and vegetable and fiber food intake, with age being a significant predictor of the majority of risk factors. So, a rises the need for programs and policies tailored toward addressing the local and targeted older women.*

Keywords: *Prevalence Non communicable diseases, risk factors, physical inactivity*

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I.   Introduction:

Once considered "disease of rich," Non communicable diseases (NCDs) have now engulfed every socio economic stratum. The current prevailing myths contributing to neglect toward NCDs in women includes defining women' stealth in terms of her reproductive capacity, perceiving NCDs, especially cardiovascular diseases as disease of men or among women from high income countries.

The long natural history of NCDs provides numerous opportunities for their prevention. The majority of NCDs share common risk factors which are preventable. As per census 2011, the proportion of urban population in Delhi is 97.5%, of which nearly half are the urban poor. Women, especially those belonging to the under privileged section are more likely to be neglected during the assessment of NCDs and their risk factors. The study was conducted to know the burden of NCD risk factors and their socio demographic determinants among the women belonging to this attended section.

II. Material and Methods:

Across the sectional study was conducted in an urbanized village of Delhi from November 2023 to April 2024. Women 25-64 years of age residing in the area for more than 6 months were included in the study. Pregnant and postpartum women up to 6 months from child birth were excluded as the above will hamper in anthropometric estimation. Furthermore critically ill women who were unable to provide information were excluded from the study.

Sample size:

A sample size of 352 was calculate (using EpiInfo7.2.0.1.),taking into account an expected prevalence of physical inactivity as 52.4% among women, with 95% confidence Interval and absolute error of 5%, Using a finite population of 5400 which was rounded off to 360.

Data collection:

Data were collected using the WHOSTEPS instrument. Pre translated Hindi version of the questionnaire was used. Physical activity was assessed using the Global Physical Activity Questionnaire. Anthropometric measurements including height, weight, and waist circumference were measured using standardized instruments. The measurements were taken as per the WHO STEPS manual.

Blood pressure was measured to nearest to 1mm of Hg. Three blood pressure measurements were taken at 3 min interval in the left arm in sitting position and average of the last two was considered for data analysis. Biochemical test was done on every third participant (124 participants). The participant was instructed for 12 hours of overnight fasting on the day of interview. Biochemical analysis was done next morning using the dry chemistry method under all aseptic precautions. Easy Touch Blood Glucose and Cholesterol Monitoring System were used for estimation of glucose and cholesterol, which is designed for quantitative estimation of glucose and cholesterol level in fresh capillary whole blood. A written report of bio chemical analysis was handed over to the participants. Participants with increased blood pressure, blood cholesterol and blood glucose, or untreated NCD were referred to the nearest health care facility. Approval from the Institutional Ethics Committee was taken for conducting the study.

Sampling procedure

The nearby area catered to a population arround 32,000 with nearly 5400 women in the age group of 25–64 years. A list of eligible women was made from the survey registers of the Anganwadi Centers (AWC). Eighteen women were selected from each AWC using systematic random sampling method. Selected women were contacted at their home and were interviewed individually after taking informed consent. In the case of refusal to participate or non availability of participant after 3 consecutive visits, the next house was taken for selection. The village catered to a population of 32,000 with nearly 5400 women in the age group of 25–64 years. A list of eligible women was made from the survey registers of the Anganwadi Centers/Schools. Eighteen women were selected from each center using systematic random sampling method. Selected women were contacted at their home and were interviewed individually after taking informed consent. In the case of refusal to participate or non availability of participant after 3 consecutive visits, the next house was taken for selection.

Data analysis

The data were analyzed using the IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., OP Stat, Armonk, NY).The level of significance to test the statistical association of various risk factors and socio economic determinants was taken as $P<0.05$.TheChi‑square test was used for doing univariate analysis for categorical variables. To find out the predictors of risk factors for NCDs, binary logistic regression was applied taking individual risk factor as dependent variable.

Table1: Results of binary logistic regression analysis relating behavioral risk factors with socio demographic characteristics:

Socio demographic characteristics inactivity[§](n=360)	Tobacco use[#](n=360)		Physical	
	Prevalence (%)	OR(95% CI)	Prevalence (%)	OR(95% CI)
Age(years)				
25- 44	13.5	Referent	57.6	Referent
45- 65	30.2	2.26 (1.21- 4.22)*	71.0	1.85 (1.08- 3.23)*
Residence				
Resident	17.1	Referent	56.0	Referent
Tenant	18.7	1.28 (0.67- 2.47)	64.4	1.45 (0.89- 2.37)
Religion				
Hindu	18.7	2.13 (0.25- 17.80)	60.5	-
Muslim	10.1	Referent	100.0	-
Marital status				
Married	15.7	Referent	61.5	Referent
Unmarried/separated/widowed	46.9	3.59 (1.56- 8.27)*	62.3	1.01 (0.45- 2.30)
Education				
<Primary	23.5	2.12 (1.05- 4.23)*	66.0	1.27 (0.80- 2.09)
>Primary	9.6	Referent	54.1	Referent
Occupation				
Employed	28.2	2.04 (0.89- 4.66)	43.6	Referent
Unemployed	17.2	Referent	63.5	2.26 (1.13- 4.62)*
Socio economic status				
Upper	16.0	Referent	58.3	Referent
Middle	15.0	0.96 (0.45- 2.04)	56.9	0.94 (0.55- 1.62)
Lower	25.4	1.87 (0.91- 3.84)	71.7	1.53 (0.85- 2.78)
Total	18.5		61.4	

*$P<0.05$, [#]Current use (in last 30 days) and daily use of tobacco, [§]A person not achieving any combination of walking, moderate or vigorous intensity

Activities to a minimum of at least 600MET‑minutes per week .METs: Metabolic Equivalents, OR: Odds ratio CI: Confidence interval

III. Result:

The prevalence of NCDs among women in Meerut is alarmingly high. Cardiovascular diseases and diabetes are the most common, followed by chronic respiratory diseases and cancers. Key risk factors identified include sedentary lifestyle, unhealthy dietary habits, obesity, smoking, and alcohol consumption. Additionally, socio-economic factors, such as low education levels and limited access to healthcare, significantly contribute to the higher prevalence of these diseases. Almost 70% of the participants were in the age group of 25–44 years, and rest between 45 and 65 years of age of 360 participants, 235 (63.5%) had less than primary education. Majority of the study participants were married (91.4%) and Hindu (97.3%) by religion. Only one third was original residents of the village and rest was tenants, originally from other states. Only 10% of the total participants were employed. The prevalence of smoking and smokeless tobacco was found to be 7.2% (3.7% bidi, 3.9% hookah) and 11.4%, respectively. Majority (92%; 25) of these study participants used to smoke daily. Smokeless tobacco consumption was significantly higher among tenants and women belonging to lower socio economic status on univariate analysis. Odds of overall tobacco consumption was significantly higher among older women (45–65years) unmarried /separated/ widowed women (OR: 3.59 [1.56–8.27]), and those who had education less than primary school (OR: 2.12 [1.05–4.23]) [Table 1].Very few of the women reported intake of alcohol.

The prevalence of physical inactivity was significantly higher among older (OR: 1.85 [1.08–3.23]) and unemployed women (OR: 2.26 [1.13–4.62]) [Table 1]. Majority of the study participants (96.5%) consumed <5 servings of fruits and vegetables per day. The prevalence of overweight and obesity was found to be 28.3% and 5.9%, respectively. Almost one third of the study participants had body mass index>25kg/m2.Central obesity was prevalent among three fourth of the study participants. Odds of overweight/obesity were significantly higher among the original residents (OR: 1.76 [1.07–2.86]) and those belonging to upper socioeconomic status (OR: 1.84 [1.01–3.35]) [Table 2]. Less than one third of the study participants had their blood pressure measured in the past 12 months. Twenty three percent of the study participants had raised blood pressure, including those who were currently on medication for raised blood pressure. Significantly higher prevalence of raised blood pressure was observed among older age group (OR: 3.78 [2.14–6.71]) and participants with less than primary school education (OR: 2.50 [1.30–4.76]. Raised blood glucose was found in 22.1% of the study participants whose blood glucose was measured. Women belonging to the older age group (OR: 6.36 [2.19–

18.46]) and those belonging to lower socio economic status (OR: 4.78 [1.38–16.46]) were more likely to have raised blood glucose. There was no significant association between raised blood cholesterol and socio demographic determinants of the study participants. "Physical inactivity is a significant risk factor, with 40% of women reporting less than 30 minutes of physical activity per day. Dietary habits reveal that 60% of women consume diets high in saturated fats and low in fruits and vegetables."

Table2: Results of binary logistic regression analysis relating obesity with socio demographic characteristics

Socio demographic characteristics obesity^ (n=360)	Overweight/obesity¥(n=360)			Abdominal		
	Prevalence (%)	OR	(95% CI)	Prevalence (%)	OR	(95% CI)
Age(years)						
25-44	28.9	Referent		69.2	Referent	
45-65	44.1	1.63 (0.95-2.76)		84.1	2.42 (1.25-4.56)*	
Residence						
Resident	44.8	1.76 (1.07-2.86)*		85.8	2.44 (1.31-4.38)*	
Tenant	27.1	Referent		66.5	Referent	
Religion						
Hindu	34.4	-		73.9	1.12 (0.29-4.21)	
Muslim	0	-		60.0	Referent	
Marital status						
Married	34.0	2.36 (0.99-5.51)		73.4	1.71 (0.67-4.35)	
Unmarried/separated/widowed	28.1	Referent		35.0	Referent	
Education						
<Primary	34.5	1.25 (0.75-2.08)		70.2	Referent	
>Primary	31.9	Referent		79.3	1.68 (0.97-2.93)	
Occupation						
Employed	41.0	1.79 (0.86-3.70)		71.8	Referent	
Unemployed	32.8	Referent		73.7	0.88 (0.40-1.93)	
Socio economic status						
Upper	43.1	1.84(1.01-3.35)*		82.6	1.58 (0.81-2.94)	
Middle	29.2	1.05 (0.57-1.94)		68.3	0.99 (0.55-1.78)	
Lower	25.5	Referent		67.0	Referent	
Total	32.9			73.5		

*$P<0.05$,¥BMI>25.5kg/m^2,^Waist circumference>80cm.OR: Odds ratio, CI: Confidence interval

IV. Discussion

The high prevalence of NCDs among women in Meerut is a result of both modifiable and non-modifiable risk factors. Lifestyle interventions and public health strategies focusing on education, prevention, and early detection are crucial. Tailored healthcare services that address the unique needs of women in urban settings are also essential. The study was conducted to assess the burden and predictors of behavioral and biological risk factors for NCDs. The prevalence of overall tobacco use was observed to be18.4%, which is much higher than the figure of 1.6%, as reported by the National Family Health Survey (NFHS 4). Overall tobacco consumption was higher among older age group and unmarried/ separated/ widowed women. However, smoking was practiced significantly more among the residents in the age group of 45–65 years which could be due to the prevailing socio cultural practices among older women in the community. A higher prevalence of smokeless tobacco consumption was also observed in the current study in comparison to other similar studies. Higher prevalence of smokeless tobacco use was found among the ten ants who were migrants mainly from Bihar and Uttar Pradesh. Studies done in the area also reported higher prevalence of smokeless tobacco among women. Thus, the belief that' smoking is a risk factor only in men may not hold true, and thus arises the need for counseling among women too.

None of the women reported alcohol consumption in the study, while NFHS-4 (Meerut) reported 0.7% alcohol consumption among women. Various studies have reported similar findings. Inadequate physical activity was found to be 61.6%. Almost similar finding were reported by Zaman et al. in Bangladesh and also by Anand et al. in India. Socio cultural restrictions among women, lack of access to the facilities owing to the poorly planned urbanization in the area could be the reasons behind such findings. The lack of indulgence in vigorous sander creational activity also highlights toward rising trends of overweight and obesity.

In our study, inadequate fruits and vegetable intake was observed as the most prevalent risk factor. Overall consumption of fruits was much less as compared to vegetables. Lower consumption of fruits could be due to the lack of affordability, and also, as women are the last in the family to consume food these may not be available for them.

Almost one third of the study participants in the current study were either overweight or obese. The findings were in concordance with studies done in India. On the contrary, studies done by Misra et al. in Assam and Kumar et al. in Patna have reported much lower prevalence of overweight. A high prevalence of overweight and obesity could have been due to inadequate dietary practices and easy availability and affordability of unhealthy foods. Overweight and obesity were significantly higher among older age group, similar to the findings reported by other studies. Among the respondents who gave a history of raised blood pressure, more than half of them were not on any antihypertensive medication which points toward significant amount of unmet need for control of hypertension. Trends of rising blood pressure with age have also been reported by other author.

Table3: Results of binary logistic regression analysis relating non communicable disease risk factors with socio demographic-characteristics

Socio demographic characteristics pressure[#](n=360)	Inadequate fruit and vegetable[$]intake (n=360)		Raised blood	
	Prevalence (%)	OR(95% CI)	Prevalence (%)	OR(95% CI)
Age(years)				
25-44	93.2	Referent	14.8	Referent
45-65	96.5	1.53 (0.30-7.90)	44.9	3.78 (2.14-6.71)*
Residence				
Resident	94.4	Referent	28.4	1.22 (0.66-2.10)
Tenant	93.8	1.49 (0.44-5.01)	20.8	Referent
Religion				
Hindu	97.2	-	23.1	Referent
Muslim	100.0	-	40.0	2.56 (0.67-10.60)
Marital status				
Married	96.2	-	23.1	Referent
Unmarried/separated/widowed	100.0	-	28.1	0.64 (0.26-1.56)
Education				
<Primary	97.2	1.68 (0.48-5.51)	30.2	2.55 (1.30-4.76)*
>Primary	95.1	Referent	11.9	Referent
Occupation				
Employed	100.0	-	20.5	Referent
Unemployed	96.3	-	23.9	0.98 (0.40-2.37)
Socio economic status				
Upper	98.5	2.50 (0.37-16.62)	27.8	1.22 (0.61-2.33)
Middle	93.4	0.41 (0.14-1.64)	17.5	0.69 (0.34-1.38)
Lower	97.1	Referent	24.5	Referent
Total	96.7		23.0	

*P<0.05,[$] Consuming less than five servings of fruit and vegetables per day, [#]SBP> 140mmHgorDBP> 90mm Hg or currently on medication. OR: Odds ratio, CI: Confidence interval, SBP: Systolic blood pressure, DBP: Diastolic blood pressure

Table4: Results of binary logistic regression analysis relating Biochemical risk factors with socio demographic characteristics:

Socio demographic characteristics cholesterol[€](n=124)	Raised blood sugar[Ψ](n=124)		Raised blood	
	Prevalence (%)	OR(95% CI)	Prevalence (%)	OR(95% CI)
Age(years)				
25-44	11.4	Referent	40.5	Referent
45-65	40.4	6.36 (2.19-18.46)*	44.7	1.32 (0.58-2.98)
Residence				
Resident	18.5	Referent	40.7	Referent
Tenant	25.0	1.54 (0.53-4.45)	43.1	0.99 (0.45-2.18)

Religion				
Hindu	23.0	-	42.6	0.43 (0.04‑4.62)
Muslim	0.0	-	25.0	Referent
Marital status				
Married	21.2	Referent	43.4	2.07 (0.55‑7.85)
Unmarried/separated/widowed	30.8	1.07 (0.24‑4.69)	30.8	Referent
Education				
<Primary	25.0	0.90 (0.26‑3.09)	42.4	1.08 (0.44‑2.62)
>Primary	14.7	Referent	41.2	Referent
Occupation				
Employed	20.0	Referent	70.0	3.58 (0.85‑14.91)
Unemployed	22.4	1.72 (0.23‑12.78)	39.7	Referent
Socio economic status				
Upper	15.8	Referent	42.1	Referent
Middle	15.8	1.14 (0.32‑4.01)	39.5	0.84 (0.34‑2.06)
Lower	41.9	4.78(1.38‑16.46)*	45.2	1.05 (0.40‑2.76)
Total	22.0		42.0	

*$P<0.05$, $^{\psi}$Fasting blood glucose>110 mg/dl or currently on medication for raised blood glucose, $^{€}$Cholesterol >190mg/dl or currently on medication for Raised cholesterol. OR: Odds ratio, CI: Confidence interval

Almost 40% of the study participants had raised total cholesterol (>190mg/dl), which was in agreement to study. However, the lower prevalence was found in studies conducted in other states and some countries. This could have been either due to higher cutoff points taken by various studies or different age compositions of the participants.

V.   Conclusion:

The study shows a high prevalence of most of the known risk factors for NCDs, namely, physical inactivity, insufficient fruit and vegetable intake, overweight, and raised blood pressure, blood glucose, and cholesterol. Thus, the program and policies tailored toward addressing the local needs among this vulnerable group to prevent and control this growing burden of NCDs becomes essential with special emphasis among the older women. Women from lower socioeconomic backgrounds exhibit higher rates of NCDs. Approximately 45% of women with low educational attainment have hypertension, compared to 25% of those with higher education levels. Exposure to high levels of air pollution in urban areas like Meerut contributes to the prevalence of chronic respiratory diseases, affecting 25% of women surveyed.

Policy Interventions: Implement comprehensive public health policies focusing on preventive measures and early detection of NCDs.

Awareness Programs: Launch targeted awareness campaigns to educate women about the importance of a healthy lifestyle and regular medical check-ups.

Healthcare Accessibility: Improve healthcare infrastructure and accessibility, particularly in underserved areas, to ensure timely diagnosis and treatment.

Community Engagement: Foster community-based initiatives to promote physical activities and healthy eating habits.

Addressing these risk factors through coordinated efforts involving government, healthcare providers, and community organizations is crucial. By adopting a multi-faceted approach, it is possible to reduce the burden of NCDs and improve the overall health and well-being of women in urban areas like Meerut.

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