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A Comparative Study to Identify Risk Factors Associated with Non-Communicable Diseases Among Migrants and Non-Migrants in an Urban Slum Using the WHO STEPS Approach

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ABSTRACT

Background:Noncommunicable diseases (NCDs) pose a rising burden globally, with a disproportionate impact on urban slum dwellers and vulnerable populations like migrants due to unhealthy lifestyle and limited healthcare access.

Objectives:To compare the prevalence of risk factors for NCDs among migrants and non-migrants living in an urban slum, using the World Health Organization (WHO) STEPwise approach to NCD risk factor surveillance (STEPS).

Methods:A cross-sectional observational study was conducted among 286 participants (143 migrants and 143 non-migrants with the mean age of 40.2 years) in an urban slum in a metropolitan city of Maharashtra. Stratified random sampling was employed. Data were collected using a pre-tested questionnaire based on the WHO STEPS. Additionally anthropometric, biochemical, and clinical parameters were recorded.

Results:Migrants exhibited significantly higher prevalence of hypertension (53.1% vs. 28.7%, $p<0.001$), diabetes (35% vs. 21.7%, $p<0.01$), and obesity (16.8% vs. 7.7%, $p<0.05$). Logistic regression revealed significant associations between NCDs and low physical activity (OR=8.8), tobacco use (OR=8.6), migration status (OR=3.2), and overweight/obesity (OR=6.6–7.5) compared with non-migrants.

Conclusion:Migrants are at higher risk for NCDs due to lifestyle changes post-migration. These changes include low physical activity, migration status and overweight/obesity, that have significant associations with NCDs. Urgent public health interventions focusing on behaviour modification, early screening, and primary prevention are needed in migrant communities.

Keywords: *Non-communicable diseases, migrants, urban slums, WHO STEPS, physical inactivity, risk factors*

1. INTRODUCTION

Non-communicable diseases (NCDs) are now the leading cause of death globally, accounting for 74% of deaths worldwide, with over 85% of premature NCD deaths occurring in low- and middle-income countries (LMICs) like India[1]. Prevalence of NCD in urban slums is high due to increasing trend of modifiable risk factors. Urban slums are characterized by overcrowding, poverty, poor sanitation, inadequate access to healthcare, high levels of pollution, occupational stress, and substance use, all of which increase the vulnerability of residents, mostly migrants to NCDs[2].

Migration is a process of social change during which people move from one cultural setting to another in order to settle for a longer period of time or permanently3. Studies show that internal migrants are more prone to behavioural risk factors and chronic illnesses compared to their non-migrant counterparts[4–7]. Migration from rural to urban areas has been associated with deleterious lifestyle and behaviour patterns; increased consumption of saturated fats and lower consumption of complex carbohydrates, polyunsaturated fatty

acids and fibres, in addition to decreased physical activity and psychosocial stress8-9...

Chronic anxiety, homesickness and isolation lead to depression as well as stress related health issues in migrants. This results in increase their risk for chronic diseases and risk factors pushing them in to morbidity and mortality10

Information on the health issues of internal migrants residing in urban slums of growing metropolitan cities, remains limited. Hence, this study aims to compare the prevalence of risk factors of NCDs between migrant and non-migrants and to analyse associations between them.

2. METHODOLOGY:

Study Design and Setting: This community-based, cross-sectional, observational, comparative study was conducted in an urban slum, a field practice area of the Department of Community Medicine, located in a metropolitan city Mumbai, India. The study area was divided into 11 sectors (A–K), comprising multiple lanes and households, predominantly inhabited by lower socio-economic groups. The area is served by one urban health centre, one municipal maternity home, and multiple private practitioners. Approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Study Population: The study included 286 participants aged 25-60 years fulfilling the residence criteria and given willingness to participate in the study by informed consent. Participants were considered as migrants if they resided in the area for > 2 years and < 15 years. Those migrants resided in the area for < 2 years were excluded from the study. Migrants from various states constituted majority of the population and were mainly working in industries of Zari work, bag-making, tailoring and driving.

Sample Size: The sample size was calculated using the method reported in previous study[9].The formula used for sample size calculation is mentioned below:

$N=8\times(p1q1+p2q2)/(p1-p2)2$ (Where N: Total sample size; p1: NCDs prevalence in migrants; p2: NCDs prevalence in non-migrants; q1= p1-1; q2= p2-1; (p1−p2)2: effect size; factor of 8 to represent the required Z-scores for a 95% confidence level and 80% power)

Substituting the values:

$N=8\times (71.3\times28.7+15\times85)/ (13.7)2=143$

Thus, 143 participants were selected in each group, totaling 286 participants.

Sampling Method: From each of the 11 sectors (A–K), 13 migrants and 13 non-migrants (both males and females) were selected using simple random sampling, ensuring balanced representation across groups.

Sampling method and data collection: Participants were selected from the 11 sectors of the study area (A-K) and grouped as migrants (n=13) and non-migrants (n=13) using simple random sampling method, ensuring balanced representation across groups.

A validated semi-structured questionnaire based on WHO STEPS approach was used for data collection. Interviews were conducted at a participant's home for a duration of 45-60 minutes. After collecting the sociodemographic data, behavioural risk factors (diet, tobacco, alcohol) and self-reported hypertension and diabetes, physical measurements (height, weight, blood pressure) were taken by ensuring that each participant had been seated for at least 15 mins as per WHO protocol. In the next step, fasting and postprandial blood glucose levels at the urban health centre was measured.

Statistical Analysis: Chi-square tests were used to assess the differences between the groups, and logistic regression was applied to identify independent risk factors. A p-value <0.05 was considered statistically significant. The software used for the analysis was SPSS v26.

Results:

Total 286 participants were selected for the study with equal distribution of 143 participants in each group as migrants and non-migrants respectively.

Demographics:

Migrants were predominantly younger compared to the non-migrants with higher prevalence in age group 25-34 years (41.2% vs. 27.3%) and more likely to live in rented homes (88.9% vs. 4.8%, p<0.001). The mean age of the participants was 40.2 (±9.4) years. And majority of them were male (71%) and remaining were females (29%). Education levels were higher among migrants, with more completing higher secondary education (32.2% vs. 16.7%, p<0.0001). Occupationally, migrants were more involved in semi-skilled work (55.9%) while non-migrants had more skilled workers (24.4%, p<0.0001). Socio-economic differences were also significant, with more migrants in the upper-middle class (54.5% vs. 42.7%, p<0.01) (Table 1).

Table 1: Comparison of sociodemographic characteristics of migrants and non-migrants:

Sr. No.	Variable	Type of Resident				p-value
		Migrant		Non-migrant		
1.	**Age group (years)**	**n**	**(%)**	**n**	**(%)**	
	25 to 34	59	41.2	39	27.3	0.028
	35 to 44	41	28.7	45	31.5	
	45 to 54	35	24.5	40	28	
	55 to 60	08	5.6	19	13.2	
2.	**Gender**					0.362
	Male	98	68.5	105	73.4	
	Female	45	31.5	38	26.6	
3.	**Religion**					0.362
	Muslim	81	56.6	78	54.5	
	Hindu	54	37.8	64	44.8	
	Christian	08	5.6	01	0.7	
4.	**Marital status**					<0.05
	Married	131	91.6	119	83.2	
	Others*	12	8.4	24	16.8	
5.	**Education**					<0.0001
	No schooling	03	2.1	25	17.5	
	Primary	41	28.7	28	19.6	
	High school	44	30.7	55	38.5	
	Higher Secondary	46	32.2	24	16.7	
	>Graduate	09	6.3	11	07.7	
6.	**Occupation**					<0.0001
	Unskilled	13	9.1	14	9.8	
	Semi-skilled	80	55.9	62	43.4	
	Skilled	09	6.3	35	24.4	
	Others**	41	28.7	32	22.4	
7.	**Socioeconomic Class**					<0.01
	Upper$	06	4.2	05	3.5	
	Upper Middle	78	54.5	61	42.7	
	Lower Middle	33	23.1	56	39.2	
	Upper Lower	24	16.8	18	12.5	
	Lower	02	1.4	03	2.1	
8.	**Type of Residential arrangement**					<0.001
	Own	16	11.1	138	95.2	

	Rented	127	88.9	7	4.8	
9.	**Type of House**					<0.001
	Kutcha	27	18.9	14	9.8	
	Semi-pukka	82	57.3	61	42.6	
	Pukka	34	23.8	68	47.6	

[Note: p<0.05: statistically significant;

*Others included unmarried, widowed and divorced/separated

** Others included homemakers, professionals etc

Table 2: Comparison of physical characteristics between migrants and non-migrants

Variable (WHO scale: BMI in Kg/m^2)		**Migrant**		**Non-Migrant**		**p-value**
		n	**(%)**	**n**	**(%)**	
Underweight (<18.5)	Yes	06	4.2	05	3.5	0.758
	No	137	95.8	138	96.5	
Normal (18.5-24.99)	Yes	50	35	78	54.5	<0.001
	No	93	65	65	45.5	
Overweight (25-29.99)	Yes	63	44.1	49	34.3	<0.05
	No	80	55.9	94	65.7	
Obesity (>30)	Yes	24	16.8	11	7.7	<0.05
	No	119	83.2	132	92.3	

[Note: p<0.05: statistically significant]

Table 3: Comparison of abdominal obesity among migrants and non-migrants

Abdominal Obesity	**Migrants**		**Non-Migrants**		**Total**	
	n	**(%)**	**n**	**(%)**	**n**	**(%)**
Yes	95	66.4	85	59.4	180	62.9
No	48	33.6	58	40.6	106	37.1
Total	143	100	143	100	286	100
Test	Value	df	p-value		Significance	
Pearson's chi-squared test	1.499	1	0.221		Non-significant	

Table 4: Comparison of disease status among migrant and non-migrants

Variable		Migrant		Non-Migrant		p-value
		n	(%)	n	(%)	
Hypertension	Yes	76	53.1	41	28.7	<0.001
	No	67	46.9	102	71.3	
Diabetes	Yes	50	35	31	21.7	<0.01
	No	93	65	112	78.3	
HTN+DM	Yes	40	28	26	18.2	<0.05
	No	103	72	117	71.8	

[Note: p<0.05: statistically significant]

Table 5: Multivariate logistic regression with non-communicable disease status as an outcome

Sr. No.	Variable	Coefficient (β)	Standard Error (S.E.)	Wald Test $[W = \left(\frac{\beta}{\text{s.e.}}\right)]^2$	Significance	Odd's ratio	95% confidence interval for Odd's ratio	
							Lower	Upper
1.	Positive Family History of NCDs	1.202	0.340	12.489	<0.001	3.326	1.708	6.476
2.	Ever user of Tobacco	2.155	0.438	24.161	<0.001	8.631	3.654	20.386
3.	Ever user of Smokeless tobacco use	1.530	0.416	13.552	<0.001	4.620	2.045	10.434
4.	Ever user of Alcohol	0.313	0.434	0.521	0.471	1.367	0.585	3.198
5.	<5 fruit/veg servings	1.566	0.618	6.416	<0.05	4.687	1.425	16.082
6.	Low Physical Activity	2.171	0.450	23.248	<0.001	8.769	3.628	21.197
7.	Overweight	1.887	0.376	25.202	<0.001	6.600	3.159	13.789
8.	Obesity	2.015	0.542	13.833	<0.001	7.502	2.594	21.694
9.	Migration	1.157	0.247	21.880	<0.001	3.182	1.959	5.167

Prevalence of NCDs:

Migrants exhibited elevated body mass index (BMI), with higher prevalence of obesity (16.8 vs. 7.7%, p< 0.05) and overweight categories (44.1 vs. 34.4%, p< 0.05) as compared with non-migrants. Abdominal obesity was more prevalent among migrants than non-migrants (66.4% vs. 59.4%). Similarly, migrants showed higher frequency of hypertension (53.1%

vs. 28.7%, p<0.001), diabetes (35% vs. 21.7%, p<0.01) and co-occurrence of both conditions (28% vs. 18.2%, p<0.05) relative to non-migrants.

Association between risk factors and NCD:

Multivariate logistic regression identified several statistically significant (p<0.05) predictors of NCDs: Low physical activity (OR=8.77, CI=3.63-21.2), tobacco use (OR=8.63, CI=3.65-20.4), smokeless tobacco (OR=4.62, CI=2.04-10.4), low fruit/vegetable intake (OR=4.69, CI=1.4-16.1), overweight (OR=6.60, CI=3.15-13.8), obesity (OR=7.50, CI=2.6-21.7), positive family history of NCDs (OR=3.33, CI=1.71-6.5), and migrant status (OR=3.18, CI=1.95-5.2). Migration was found to be an independent and strong predictor of NCDs even after adjusting for lifestyle and behavioural risk factors.

3. DISCUSSION:

Migrants in urban slums face a challenge in the new environment and experiencing vulnerability to chronic diseases and exacerbates health disparities within urban populations[11-14].

Our study demonstrated a significantly higher prevalence of NCDs among migrants compared to non-migrants in urban slums. Hypertension (53.1% vs. 28.7%, p<0.001), diabetes (35% vs. 21.7%, p<0.01), and obesity (16.8% vs. 7.7%, p<0.05) were more common among migrants compared to non-migrants. Logistic regression analysis further revealed strong associations between NCDs and ow physical activity (OR=8.8), tobacco use (OR=8.6), migration status (OR=3.2), and overweight/obesity (OR=6.6–7.5). These findings highlight migration as an independent predictor of NCD risk.

Another study reported that urban slum populations exhibited obesity and physical inactivity patterns similar to those of urban residents, reflecting integration into sedentary urban lifestyles. The observed higher prevalence of obesity and metabolic conditions among migrants aligns with the Indian migration study, which showed that rural-to-urban migrants had higher BMI and lower physical activity than their rural counterparts[15]. Similarly, Ebrahim et al. reported higher rates of hypertension and diabetes among urban migrants compared to rural residents in Chennai[16]. In our study, overweight and obesity were more common among migrants, which corroborates findings from the Indian migration study which showed migrants had higher BMI and lower physical activity than their rural siblings[17].

Physical inactivity (OR=8.8 with 95% C.I) emerged as a strong risk factor, echoing WHO findings that lack of exercise contributes to approximately 3.2 million deaths globally per year[18]. Furthermore, our finding indicated a strong association between tobacco use and NCDs (OR = 8.6, with 95% C.I), which aligns with the Global Adult Tobacco Survey, India (2016–17), highlighting the disproportionately high tobacco use in low-income urban communities[19].

Dietary behaviour also played a key role; fewer than 5 servings of fruits/vegetables daily was associated with nearly 5-fold higher risk of NCDs, consistent with prior urban studies[20]. Migration, in itself, was an independent predictor of NCDs (OR=3.2 with 95% C.I). This aligns with studies from other LMICs where migration induced psychosocial stress, changed dietary habits, and decreased physical activity contribute to chronic diseases[21].

However, in contrary to our findings, a study in China has reported that younger migrants initially had a lower NCD burden than non-migrants, largely due to their younger age structure. Although, with longer urban residence, the risk of NCD increased, a pattern consistent with our finding that migrants who had lived in the city for more than two years showed higher prevalence of hypertension, diabetes, and obesity[22].

The strengths of this study include its focus on a vulnerable and understudied population, robust data collection on behavioural risk factors, and use of multivariable regression analysis to identify independent predictors. Nonetheless, a few limitations warrant consideration. The sectional design limits causal inference, and self-reported data on lifestyle behaviours may be subject to recall and social desirability bias. Additionally, findings may not be generalizable to all urban migrant populations beyond the study setting. Despite these limitations, the study provides critical insights for designing targeted interventions focusing on lifestyle modification, regular screening, and improved access to healthcare for migrant communities in urban slums.

4. RECOMMENDATIONS:

The rise in prevalence of NCD in slums presents a significant challenge. Therefore, effective strategies need to be adopted for awareness, diagnosis and treatment. This can include campaigns and information, education and communication (IEC) activities promoting healthy life style, integration of migrants into urban slum development programs, training of community workers on migrant-specific NCD risk as well as regular monitoring of blood pressure, blood sugar and BMI.

5. CONCLUSION:

Migration to urban slums significantly increases the risk of non-communicable diseases due to unfavourable shifts in lifestyle, diet, and stress levels. Therefore, targeted public health strategies focusing on prevention, screening, and risk reduction are essential to combat the growing burden of NCDs among migrant populations in Indian cities.

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