Received: 13 June 2023 | Revised: 29 January 2024 | Accepted: 25 April 2024

DOI: 10.1111/ijn.13263

ORIGINAL RESEARCH

INTERNATIONAL JOURNAL of NURSING PRACTICE WILEY

Prevalence of non-communicable disease risk factors among nursing staff in a low and middle-income country: A cross-sectional digital survey-based study

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Funding information
We did not receive any funding for this study.

Abstract

Aim: To assess the prevalence of non-communicable disease risk factors among the nursing staff and educate them on prevention.

Background: Nursing staff is integral to the Indian community healthcare systems. Recent studies report a high prevalence of non-communicable diseases in Indian nursing staff. Therefore, data on the prevalence of non-communicable disease risk factors among nursing staff are crucial for education on prevention.

Design: A cross-sectional digital survey-based study.

Method: We invited 4435 nursing staff to attend our online survey. We used a customized questionnaire for data collection, including a digitized version of the Community-Based Assessment Checklist form. A score of >4 was considered high risk and warranted screening.

Result: Among 682 nursing staff who attended, 70% had never undergone screening for non-communicable diseases. The prevalence of non-communicable disease risk factors was significantly higher in male nursing staff. In addition, logistic regression analysis showed that age, tobacco and alcohol use, increased waist circumference, physical inactivity and family history of non-communicable diseases were significant risk factors among nursing staff.

Conclusion: The study findings suggest that the nursing staff have suboptimal self-health concerns on non-communicable diseases. This situation warrants

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continued medical education, awareness campaigns on adopting a healthy lifestyle and health promotion.

KEYWORDS
community healthcare, health education, non-communicable disease, nursing, risk factors

Summary statement

What is already known about this topic?

- The prevalence of non-communicable diseases (NCDs) among Indian nursing staff is a growing concern, underscoring the need for comprehensive research and targeted interventions.
- Despite the significant health risks faced by this demographic, there is a notable lack of data on NCD risk factors specific to Indian nursing professionals.

What this paper adds?

- This paper adds information on the prevalence of NCD risk factors chiefly among nursing staff in the Delhi National Capital Region.
- Male nursing staff have particularly high NCD risk factors.

The implications of this paper:

- Findings may help develop routine screening programmes for nursing staff, continued nursing education and good, safe nursing practice.

1 | INTRODUCTION

Non-communicable diseases (NCDs) increase in low- and middle-income countries, resulting in high mortality rates. In India, NCDs are responsible for 65% of all deaths, with cardiovascular disease, chronic respiratory disease and cancer as leading causes of death (World Health Organization, 2022). The risk factors for NCDs include tobacco and alcohol use, physical inactivity, overweight, obesity, high-fat and -sodium intake, low-fruit and -vegetable intake, elevated blood pressure and blood glucose and cholesterol levels (World Health Organization, 2003). The Global Adult Tobacco Survey-2 (2016–2017) has reported a current prevalence of tobacco use (both smoking and smokeless) at 28.6% in India (Tata Institute of Social Sciences (TISS), Mumbai, and Ministry of Health and Family Welfare, Government of India, 2016–2017). Additionally, the fifth National Family Health Survey (NFHS-5) revealed an increase in the prevalence of overweight obesity, diabetes and hypertension among the Indian population, particularly women (Ministry of Health and Family Welfare, Government of India, 2019; Venkatrao et al., 2020; Luhar et al., 2020).

To address NCD-related morbidity and mortality, India has implemented the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) (Ministry of Health and Family Welfare, 2013–2017). Nursing staff are integral to the Indian healthcare system and are crucial in advocating health promotion and healthy lifestyle choices among the population in community healthcare (Ministry of Health and Family Welfare, 2016). As healthcare professionals, nursing staff are often perceived as exemplars for their patients and are expected to exhibit healthy behaviours. However, recent evidence suggests a high prevalence of NCD risk factors among Indian nursing staff (Harsimran et al., 2020; Kayaroganam et al., 2022). Substance abuse, such as tobacco and alcohol use; inadequate physical activity; and obesity are reported by studies conducted in tertiary hospitals in India (Aslam et al., 2018; Kayaroganam et al., 2022). In another study conducted in a 150-bed hospital in Delhi, India, the results showed that healthcare providers (doctors and nursing staff) have a high prevalence of NCDs (Sharma et al., 2014). Only a few studies report NCD risk factors in healthcare workers, particularly nursing staff in India. These studies have been conducted in individual hospitals and do not offer insights into the scale of NCD risk factors among nursing staff in India. These data on NCD risk factors among nursing staff are critical for educating nursing staff on health promotion and NCD prevention. Hence, we conducted this study with the research question: What is the prevalence of NCD risk factors among nursing staff in the Delhi National Capital Region?

2 | METHODS

2.1 | Aim

This study aimed to assess the prevalence of NCD risk factors among nursing staff and educate them on prevention measures.

2.2 | Study design

This was a cross-sectional digital survey. Since we planned the study immediately after the COVID-19 pandemic, we tried to reduce the conventional in-person interviews and conducted an online survey.

2.3 | Population and sample

We targeted nursing staff aged 30–65 years registered in the Trained Nurses Association of India, Delhi branch, from April 2021 to March 2022.

Inclusion criteria: All nurses registered in the Delhi branch of the Trained Nurses Association of India who were ≥30 years of age were eligible for inclusion in the study.

2.4 | Recruitment

The study team received details of 4435 eligible participants, registered with the New Delhi branch of the Trained Nurses Association of India. The team sent an invitation to complete the survey to all registrants.

As most nursing staff members from the TNAI Delhi branch worked in major hospitals in the Delhi National Capital Region, the study team circulated information about the study in these hospitals through their nursing departments/WhatsApp chats/TNAI meetings and sent the invitation to participate in the survey and questionnaire to the emails/WhatsApp chats. For non-respondents, we sent three rounds of reminders every fortnight. In total, 750 nurses participated in the survey.

2.5 | Data collection

The study data collection form consisted of the registration form, the participant's information sheet and consent form, the demographic data collection form and the Community-Based Assessment Checklist (CBAC) form for NCD data collection.

2.5.1 | Registration form

The registration form provided participants with a unique identification number. It allowed them to register using their mobile number and the flexibility to participate in the study at any time using their registered mobile number.

2.5.2 | Demographic data collection form

The demographic data collection form collected details of the participant's name, gender, marital status, age, current designation, years of experience, department of work and baseline data on their present and past history of NCD screening.

2.5.3 | The CBAC form

The CBAC form is a screening tool developed, validated and recommended by the government of India for community-level screening of NCDs and common cancers. The All India Institute of Medical Sciences has validated the CBAC form and reported that the prevalence of NCDs calculated in their study using the CBAC form was in line with the findings of the 5th National Family Health Survey (NFHS-5) data. The CBAC form has previously been reported to be a valid tool for screening NCDs and high-risk behaviours (Ministry of Health and Family Welfare, 2017; Kalidoss et al., 2021).

The CBAC form collected data on risk assessment and early detection of NCDs. The risk assessment section captured data on tobacco and alcohol use, waist measurement, physical activity, and NCD family history, with each risk factor category scored between 0 and 2. A score of ≥4 was considered high risk (Ministry of Health and Family Welfare, 2016; Community-based assessment checklist). The early detection section collected information on present symptoms of tuberculosis, cervical and breast cancer and abnormalities in the oral cavity.

Operational definitions applied for the survey:

'Current' tobacco and alcohol use: this means tobacco consumption in smoking or smokeless forms and alcohol consumption within 1 year.

Physical activity: activity, for example, walking, fewer than 150 min per week was considered inadequate (World Health Organization, 2017).

Waist circumferences: The criteria for abdominal obesity were waist circumferences of >80 cm in women and >90 cm in men (WHO Expert Consultation, 2004).

Risk Assessment Score: Risk assessment in the CBAC form involves assigning point values to each identified risk factor, including age, tobacco use, alcohol use, waist circumference, and family history of NCD. First, each risk factor is given a score between 0 and 2 based on the level of risk. After adding the points for all identified risk factors, scores of four or higher are considered high risk. This score prioritizes interventions to reduce the risk of NCDs in the population (Ministry of Health and Family Welfare, 2016; Community-based assessment checklist).

However, the risk score is not a definitive measure of NCD risk but rather a tool to guide the development of interventions and strategies. For a comprehensive understanding of the risk of NCDs, considering the risk score in the context of other factors such as population demographics, socioeconomic status and environmental factors is essential.

The paper-based CBAC form is the data collection tool used in national population-based cancer screening in India. We used a digital format of the CBAC form, which participants can fill out for data collection on NCDs.

2.5.4 | Pilot testing

We pilot-tested the questionnaire and registration form among nursing staff in our organization before conducting the study. Nurses mentioned that the participant's age was asked in multiple locations (including the registration form and the CBAC form); another suggestion was to provide access to information, education and communication (IEC) videos to those who refuse to participate. The nurses had no difficulty in filling out the CBAC form. The feedback was helpful to revise the data collection tool and make it more user-friendly.

The flowchart depicts the study methods (Figure 1).

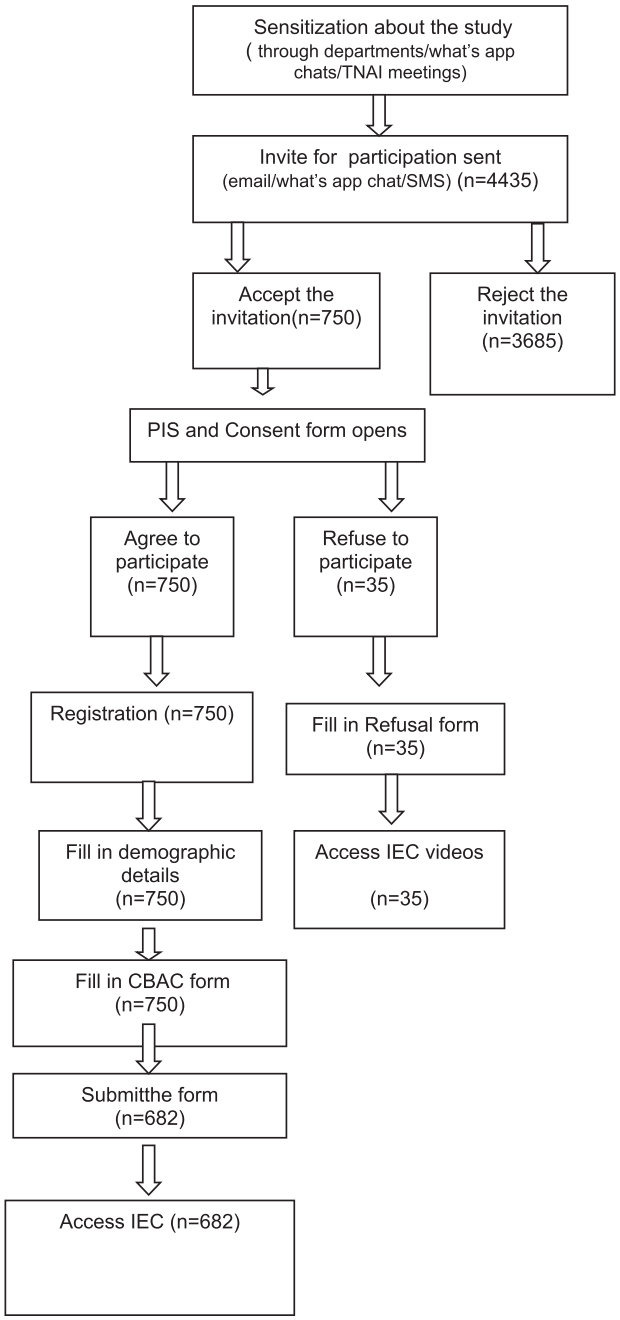

FIGURE 1 The flow chart of study methods.

2.6 | Ethical considerations

We conducted the study following the Helsinki Declaration ethical standards and principles. The Institutional Ethics Committees of the study sites approved the study.

After submitting the completed form, short IEC videos on NCD prevention were accessible to the participants. Non-participant nurses (those who refused to participate) could access the IEC videos on filling out the refusal forms.

2.7 | Data analysis

Of the 750 returned surveys, 68 surveys were incomplete and were excluded from the analysis, leaving us with 682 complete datasets for analysis. The collected data were automatically stored in a portal on a dedicated password-protected webpage to maintain the confidentiality of the data.

We performed statistical analysis using STATA version 17.0. Categorical data were presented as frequencies and percentages and Chi-square/Fisher's exact test to compare frequency data across categories as appropriate. In addition, we used the Mantel–Haenszel Chi-square test to compare age-adjusted rates between genders. We conducted univariate and multivariable logistic regression to evaluate and identify risk variables associated with high-risk NCDs. We conducted univariate logistic regression analysis by categorizing the NCD score as a binary variable, with scores of >4 classified as high risk and scores of ≤4 classified as low risk. The remaining study factors were treated as independent variables.

We reported adjusted odds ratios (ORs) with 95% confidence intervals (CIs) for statistically significant variables that emerged from the multivariable logistic regression analysis. We considered a two-sided probability of $P < 0.05$ to be statistically significant for all statistical tests.

3 | RESULTS

3.1 | Demographic details

Table 1 presents the demographic characteristics of the participants in the study. Most respondents (71%) were female nursing staff and 80% reported being married and living with their spouses. Ninety-six percent of individuals were employed in the government sector, whereas 92% were employed in the Delhi National Capitol Region. A total 73% were nursing officers.

3.2 | Risk factors for NCDS

Table 2 presents data about risk variables associated with NCDs, as obtained through the self-reported CBAC form.

TABLE 1 Demographic details of the participants.

Variables	Male $n = 195$ *n* (%)	Female $n = 487$ *n* (%)	Total $n = 682$ *n* (%)	Chi-square *P*-value
Age (in years)				
30–39	171 (87.7)	311 (63.9)	482 (70.7)	<0.001
40–49	21 (10.8)	122 (25.1)	143 (21.0)	
≥50	3 (1.5)	54 (11.1)	57 (8.4)	
Marital status				
Married	163 (83.6)	381 (78.2)	544 (79.8)	0.049
Unmarried	29 (14.9)	78 (16.0)	107 (15.7)	
Single	3 (1.5)	28 (5.7)	31 (4.5)	
Qualifications				
Diploma in nursing	46 (23.6)	185 (38.0)	231 (33.9)	<0.001
BSc nursing	129 (66.1)	226 (46.4)	350 (51.3)	
MSc nursing	20 (10.3)	70 (14.4)	90 (13.2)	
PhD in nursing	0 (0)	1 (0.2)	1 (0.1)	
Years of work experience				
0–5	79 (40.5)	112 (23.0)	191 (28.0)	<0.001
6–10	57 (29.2)	85 (17.5)	142 (20.8)	
11–15	36 (18.5)	105 (21.6)	141 (20.7)	
16–20	19 (9.7)	72 (14.8)	91 (13.3)	
21–25	4 (2.1)	61 (12.5)	65 (9.5)	
26–30	0 (0)	52 (10.7)	52 (7.6)	
Department of work				
Obstetrics & Gynaecology	3 (1.5)	38 (7.8)	41 (6.0)	<0.001
Medicine	25 (12.8)	50 (10.3)	75 (11.0)	
Surgery	23 (11.8)	64 (13.1)	87 (12.8)	
Paediatric	14 (7.2)	36 (7.4)	50 (7.3)	
Emergency/trauma	31 (15.9)	23 (4.7)	54 (7.9)	
Oncology	47 (24.1)	144 (29.6)	191 (28.0)	
Cardiology	24 (12.3)	64 (13.1)	88 (12.9)	
Others	28 (14.4)	68 (14.0)	96 (14.1)	
Work sector				
Government	190 (97.4)	462 (94.9)	652 (95.6)	0.180
Private	5 (2.6)	18 (3.7)	23 (3.4)	
Not working	0 (0.0)	7 (1.4)	7 (1.0)	
Working state				
Delhi NCR	167 (85.6)	457 (93.8)	624 (91.5)	0.001
Other states	28 (14.4)	30 (6.2)	58 (8.5)	
Designation				
Nursing officer	184 (94.4)	311 (63.9)	495 (72.6)	<0.001
Senior nursing officer	7(3.6)	122 (25.1)	129 (28.1)	
Sister in charge	2 (1.0)	37 (7.6)	39 (5.7)	
Faculty	2 (1.0)	17 (3.5)	19 (2.8)	

The prevalence of tobacco use among male nursing staff aged 30–49 years was substantially higher at 19% after adjusting for age ($P < 0.001$) compared with the female nurses of the same age group in the study. The prevalence of alcohol usage was higher among males than females among the age cohorts of 30–39 years (at 2%) and 40–49 years (5%). The waist circumference of male nursing staff was substantially greater (in 31%; 53/171: $P < 0.001$) than that of female nursing staff in all age groups. However, the prevalence of physical

TABLE 2 Risk factors for NCDs among participants: Self-reported using CBAC form.

Variable	Age Gender Male ($n = 195$) Female ($n = 487$)	30–39 ($n = 171$) Male *n* (%)	 ($n = 311$) Female *n* (%)	40–49 ($n = 21$) Male *n* (%)	 ($n = 122$) Female *n* (%)	≥50 ($n = 3$) Male *n* (%)	 ($n = 54$) Female *n* (%)	*P*-value[b] (M.H. Chi-2 test)
Tobacco use	Non-user	138 (80.7)	299 (96.1)	17 (81.0)	121 (99.2)	3 (100)	54 (100)	<0.001
	User	33 (19.3)	12 (3.9)	4 (19.0)	1 (0.8)	0 (0)	0 (0)	
P-value[a] <0.001 <0.001 NA								
Alcohol use	Non-user	168 (98.2)	310 (99.7)	20 (95.2)	121 (99.2)	3 (100)	54 (100)	0.097
	User	3 (1.8)	1 (0.3)	1 (5.2)	1 (0.8)	0 (0)	0 (0)	
Measurement of the waist (cm)	≤90	118 (69.0)	291 (93.6)	16 (76.2)	98 (80.3)	2 (66.7)	39 (72.2)	<0.001
	>90	53 (31.0)	20 (6.4)	5 (23.8)	24 (19.7)	1 (33.3)	15 (27.8)	
P-value[a] <0.001 0.163 0.835								
Physical activity	<150 min	79 (46.2)	190 (61.1)	12 (57.1)	70 (57.4)	0 (0)	34 (63)	0.002
	≥150 min	92 (53.8)	121 (38.9)	9 (42.9)	52 (42.6)	3 (100)	20 (37)	
Tobacco use	Non-user	138 (80.7)	299 (96.1)	17 (81.0)	121 (99.2)	3 (100)	54 (100)	<0.001
	User	33 (19.3)	12 (3.9)	4 (19.0)	1 (0.8)	0 (0)	0 (0)	
P-value[a] <0.001 <0.001 NA								
Measurement of the waist (cm)	≤90	118 (69.0)	291 (93.6)	16 (76.2)	98 (80.3)	2 (66.7)	39 (72.2)	<0.001
	<0.001	3 (1.8)	1 (0.3)	1 (5.2)	1 (0.8)	0 (0)	0 (0)	
P-value[a] 0.130 0.273 NA								
Measurement of the waist (cm)	≤90	118 (69.0)	291 (93.6)	16 (76.2)	98 (80.3)	2 (66.7)	39 (72.2)	<0.001
	>90	53 (31.0)	20 (6.4)	5 (23.8)	24 (19.7)	1 (33.3)	15 (27.8)	
P-value[a] < 0.001 0.163 0.835								
Physical activity	<150 min	79 (46.2)	190 (61.1)	12 (57.1)	70 (57.4)	0 (0)	34 (63)	0.002
	≥150 min	92 (53.8)	121 (38.9)	9 (42.9)	52 (42.6)	3 (100)	20 (37)	
P-value[a] 0.002 0.984 0.030								
Family history for NCD	No	95 (55.6)	109 (35)	7 (33.3)	48 (39.3)	3 (100)	25 (46.3)	<0.001
	Yes	76 (44.4)	202 (65)	14 (66.7)	74 (60.7)	0 (0)	29 (53.7)	
P-value[a] < 0.001 0.601 0.112								
NCD score	Low risk (<4)	113 (66.1)	260 (83.6)	7 (33.3)	59 (48.4)	0 (0)	16 (29.6)	<0.001
	High risk (>4)	58 (33.9)	51 (16.4)	14 (66.7)	63 (51.6)	3 (100)	38 (70.4)	
	P-value[a]	<0.001		0.202		0.552		

[a]The *P*-values are based on 2 by 2 Chi-square test for individual age groups.
[b]The *P*-values for each risk variable are based on age-adjusted Mantel–Haenszel Chi-square test.

activity exceeding 150 min per week was substantially greater ($P = 0.002$) among male nursing staff (53.8%) in the age range of 30–39 years in comparison with their female counterparts in same age group.

Overall, the study found that there was a substantially higher prevalence of high-risk scores (≥4) among male nursing staff of all age group (34%) than among the female nurses of all age groups.

3.3 | NCD rates

Table 3 presents comprehensive information regarding the screening process for NCDs among the participants. More than 70% of participants had never undergone any form of screening for NCDs, which includes screening for prevalent malignancies.

The symptoms of NCDs among the participants based on their self-reports are presented in Table 4.

Among female nursing personnel aged 40–49 years, 3% experienced challenges with mouth opening and 5% reported the presence of a lump in the breast (both potentially symptoms of malignant disorders).

Table 5 presents the unadjusted OR together with the corresponding significance level for the statistically significant factors predictive of a score in the high risk range obtained from the univariate analysis. The study findings indicate that several variables, including age, years of work experience, marital status, tobacco use,

TABLE 3 Details on awareness of NCD and cancer screening among the participants.

Variable	Age / Gender Male ($n = 195$) Female ($n = 487$)	30–39 ($n = 171$) Male n %	30–39 ($n = 311$) Female n %	40–49 ($n = 21$) Male n %	40–49 ($n = 122$) Female n %	≥50 (n = 3) Male n %	≥50 (n = 54) Female n %	*P*-value (Chi-2 test)
Ever screened	Hypertension	7 (4.1)	7 (2.3)	2 (9.5)	6 (4.9)	0 (0)	5 (9.3)	0.312
	Diabetes	8 (4.7)	12 (3.9)	0 (0)	8 (6.6)	0 (0)	3 (5.6)	0.975
	Diabetes & Hypertension	5 (2.9)	22 (7.1)	4 (19)	8 (6.6)	0 (0)	13 (24.1)	0.364
	HTN, D.M. with cancer screening	3 (1.8)	31 (10)	0 (0)	12 (9.8)	0 (0)	7 (13)	<0.001
	HTN, D.M., cardiovascular disease	11 (6.4)	10 (3.2)	1 (4.8)	10 (8.2)	0 (0)	8 (14.8)	0.420
Never screened	NCDs, including common cancers	137(80.1)	229(73.6)	14(66.7)	78(63.9)	3(100)	18(33.3)	0.071

Note: *P*-values are based on the Mantel–Haenszel Chi-square test.
Abbreviations: DM, diabetes mellitus; HTN, hypertension.

TABLE 4 Self-reported symptoms for NCDs among the participants.

Variable	Age / Gender Male ($n = 195$) Female ($n = 487$)	30–39 ($n = 171$) Male n %	30–39 ($n = 311$) Female n %	40–49 ($n = 21$) Male n %	40–49 ($n = 122$) Female n %	≥ 50 ($n = 3$) Male n %	≥ 50 ($n = 54$) Female n %	*P*-value (Chi-2 test)
NCD	Hypertension	9 (5.3)	7 (2.3)	3 (14.3)	15 (12.4)	0 (0)	9 (17)	0.266[a]
	Diabetes	6 (3.6)	9 (2.9)	2 (9.5)	10 (8.3)	0 (0)	4 (7.5)	0.926[a]
Oral symptoms	Difficulty in opening mouth	3 (1.8)	3 (1.0)	0 (0)	3 (2.5)	0 (0)	0 (0)	0.956[a]
	Non-healing ulcers	1 (0.6)	5 (1.6)	0 (0)	2 (1.6)	0 (0)	1 (1.9)	0.449[a]
	Change in voice	3 (1.8)	4 (1.3)	0 (0)	2 (1.6)	0 (0)	1 (1.9)	0.810[a]
Female participants only								
Breast symptoms	Lump in the breast	15 (4.8)		6 (4.9)		1 (1.9)		0.719[b]
	Nipple discharge	3 (1.0)		0 (0)		0 (0)		0.693[b]
	Change in breast shape & size	9 (2.9)		1 (0.8)		0 (0)		0.277[b]
Cervical symptoms	Intermenstrual bleeding	17 (5.5)		5 (4.1)		0 (0)		0.204[b]
	Post-coital bleeding	3 (1.0)		1 (0.8)		1 (1.9)		0.628[b]
	Post-menopausal bleeding	0 (0)		0 (0)		1 (1.9)		0.111[b]
	Foul-smelling discharge	7 (2.3)		6 (4.9)		0 (0)		0.162[b]

[a]Based on Mantel–Haenszel Chi-square test.
[b]Based on the Chi-square trend in the proportion.

alcohol consumption, waist circumference exceeding 90 cm, insufficient physical activity (<150 min of walking per week) and a family history of NCDs are noteworthy risk factors for high-risk NCD scores. Table 5 also presents the results of multivariable logistic regression analysis, indicating those variables that were statistically significantly linked to high-risk scores along with their corresponding adjusted ORs and 95% CIs. The results of the age-adjusted analysis indicate that several factors, including smoking habit, alcohol consumption habit, waist circumference exceeding 90 cm and physical activity, are significantly associated with an increased risk of NCDs. The ORs for these factors range from 3 to 19, with corresponding 95% CIs indicating the precision of the estimates.

4 | DISCUSSION

The present study investigated the prevalence and risk factors for NCDs among nursing personnel, revealing that most participants have never undergone screening for any NCDs. Among the respondents, many were affected by NCDs. The possible explanation for the participation of nurses affected by NCDs could be the acquired awareness of NCDs and their pre-existing NCD condition. Similar findings on nurses' low awareness concerns are reported in other studies conducted in Australia and India (Perry et al., 2018; Singh et al., 2012). This scenario reflects the nursing staff's need for more NCD prevention awareness.

TABLE 5 Significant risk factors assessment of NCD high risk scores (>4) score using univariate and multivariable logistic regression analysis.

	Univariate analysis		Multivariable logistic regression analysis		
Study variables	**Unadjusted odds ratio**	***P*-value**	**Adjusted odds ratio**	**95% confidence limits**	***P*-value**
Age groups (years)					
30–39	1.0 (ref)		1.0 (ref)		
40–49	3.99	<0.001	4.58	2.29–9.16	<0.001
≥50	8.77	<0.001	12.25	4.45–33.70	<0.001
Marital status					
Single	1.0 (ref)				
Unmarried	1.14	0.797			
Married	2.38	0.061			
Working experience (years)					
≤5	1.0 (ref)				
6–10	1.09	0.754			
11–15	1.89	0.012			
16–20	2.92	<0.001			
>20	6.24	<0.001			
Waist circumstance (cm)					
<90	1.0 (ref)		1.0 (ref)		
≥90	6.92	<0.001	8.61	5.15–14.37	<0.001
Smoking status					
Never	1.0 (ref)		1.0 (ref)		
Yes	3.03	<0.001	5.31	2.65–10.66	<0.001
Alcohol consumption status					
Never	1.0 (ref)		1.0 (ref)		
Yes	10.22	0.034	18.74	1.72–204.17	0.016
Physical activity (walking time [minutes/week])					
>150	1.0 (ref)		1.0 (ref)		
≤150	2.13	<0.001	3.26	2.17–4.91	<0.001
Family history of NCDs					
Nil	1.0 (ref)				
Present	13.0	<0.001			

Nurses in our study reported high-risk habits: tobacco use and alcohol consumption, especially male nurses aged 30–49 years compared with female nurses in the same age group. The International Agency for Research on Cancer (IARC) has classified tobacco in any form (smoking and smokeless) and alcohol as group 1 carcinogens (IARC Working Group, 2004). The use of tobacco affects almost all the organs in the human body. Many research studies have described that the use of tobacco products predisposes to cardiovascular diseases and hypertension, vascular diseases, pulmonary diseases and even cancers of organs in the digestive system (oral, stomach, oesophagus, pancreas, liver, colorectum), excretory system (kidney, bladder), respiratory system (larynx, pharynx, lung) and cancer in the uterine cervix in women (Islami et al., 2018; Li & Hecht, 2022). The World Health Organization (WHO) reports, 'No alcohol level is safe'. Alcohol causes damage to many vital organs in the human body. Alcohol use leads to cancers like oral and liver cancer (World Health Organization, 2019).

Our findings align with the conclusions of another study conducted among nurses in India by Kayaroganam et al. (2022) and a study conducted among Iranian nurses (Jahromi et al., 2017). The reasons for low/no tobacco and alcohol use among female nurses in our study could be due to cultural restrictions for the use of tobacco and alcohol in India, strict hospital policies against substance abuse at the workplace or under-reporting of substance use by the participants. However, the prevalence of tobacco and alcohol consumption among nursing staff in our research is less than their counterparts in other study (Abou Elalla et al., 2019).

The measurements of waist circumference of >90 cm (abdominal obesity) was high, especially among male nursing staff. Obesity leads to NCDs like diabetes and hypertension and is also a risk factor for at least 13 cancers, including colorectal cancer and breast cancer (Pati et al., 2023). Research studies around the globe have expressed obesity/overweight as a significant health concern among nurses

(Aslam et al., 2018; Fair et al., 2009; Harsimran et al., 2020; Jahromi et al., 2017; Kayaroganam et al., 2022; Miller et al., 2008).

Our study findings were similar to the results of the study conducted by Jharomi et al. where abdominal obesity was much less frequent among female nurses (Jahromi et al., 2017). On the contrary, earlier studies in India reported high abdominal obesity among female nursing staff (Aslam et al., 2018; Harsimran et al., 2020; Kayaroganam et al., 2022; Singh et al., 2012). This contrary finding could be due to recruitment in different geographical regions, with food and cultural diversity among the study participants.

Furthermore, among our study participants, the minimum requirement for physical activities (150 min per week) was met by high numbers of the male nursing staff. On the contrary, Kayaroganam et al. report less physical activity among male nursing staff (Kayaroganam et al., 2022). Nonetheless, a key finding of our study was that male nursing staff aged 30–39 were at overall higher risk for NCDs than their female counterparts.

Another observation of our study was that married nurses had higher NCD risk factor scores compared with their unmarried counterparts. The plausible explanations could be that married individuals may have different lifestyle habits, like dietary patterns and physical activity, compared with unmarried individuals. Marriage may be a surrogate for increased age, a risk factor for NCDs. Our study shows a correlation between the increase in age among married women. However, it is essential to note that a complex interplay of multiple variables influences individual health outcomes, and these observations may not apply universally.

Similarly, nurses with increased work experience had higher risk factors for NCDs. The increase in risk factors could be because work experience and age can independently influence these scores, and their effects may be interrelated. More experience among nurses could also mean more responsibilities and increased work stress. Work stress and advanced age increase NCD risk among experienced nurses. However, the multivariate logistic regression analysis results did not indicate that employment experience was a significant influence.

The overall study findings suggest that individuals who engage in smoking, and alcohol consumption, have a waist circumference of >90 cm or have low levels of physical activity and are more likely to experience an elevated risk of NCDs. Other factors, including age and a family history of NCDs, were also found to be significant risk factors for high-risk NCD scores, which is in line with another study findings (Monakali et al., 2018).

However, it is imperative to acknowledge that maintaining a health-conscious lifestyle as a nurse can be arduous. The occupation entails physical and emotional strain, requiring nursing staff to work extended hours, irregular shifts and high-stress positions. Consequently, emphasis on personal health and wellness can prove to be a challenging endeavour. Nursing staff may have some knowledge regarding NCDs and prevention measures in their nursing practice. However, prioritizing their health is crucial. The reduced inclination towards health-seeking behaviour among nursing staff may stem from excessive workload, lack of motivation and inadequate NCD knowledge. The current prevalence of NCD risk factors among nursing personnel underscores the urgent need for implementing strategic measures for NCD control.

4.1 | Strengths and limitations

The overall participation rate was less than 20% of those eligible to take part although we cannot know what proportion of those eligible actually received information about the study. The study involved nursing staff from different hospitals in the Delhi-National Capitol Region of India making the findings more generalizable. In addition, the nursing staff in the study are members of a professional nursing association, which may help in planning education programmes on NCD prevention and organizing routine screening programmes. However, nursing staff who are less motivated to respond to online surveys may not have participated, which may be the reason for non-response bias and poor response rate. Further, participants' self-reported data using the CBAC form may have resulted in underreporting of risk behaviours. We had a limited representation of male nurses in the study. In addition, the study design was cross-sectional, which prevented the ability to follow up on NCD prevalence. Therefore, a longitudinal study is necessary to investigate this topic further.

5 | CONCLUSIONS

The study findings suggest that the nursing staff have suboptimal self-health concerns on NCDs. This situation warrants continued health education, awareness campaigns on adopting a healthy lifestyle and health promotion. However, a longitudinal study may be required to further the research in this area.

AUTHORSHIP STATEMENT

Study concept and design: Kavitha Dhanasekaran, Gopichandran Lakshmaman. Acquisition of data: Mamta Choudary, Payal Kahol Hote, Shiny Chacko, Kanagavalli Kumaresan, Neeraj Swarnkar. Analysis and interpretation of data: Vanamail Perumal, Vipin Kumar. Drafting the manuscript: Kavitha Dhanasekaran, Gopichandran Lakshmanan, Vanamail Perumal. Critical revision of the manuscript for important intellectual content: Kavitha Dhanasekaran, Gopichandran Lakshmanan, Vanamail Perumal, Roopa Hariprasad, Manjeet Singh Chalga. All authors approved of the version of the manuscript to be published. All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be

submitted to or published in any other publication before its appearance in IJNP.

CONFLICT OF INTEREST STATEMENT

No potential conflict of interest was reported by the authors.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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How to cite this article: Dhanasekaran, K., Lakshmanan, G., Perumal, V., Choudhary, M., Chalga, M. S., Hote, P. K., Hariprasad, R., Kumar, V., Chacko, S., Kumaresan, K., & Swarnkar, N. K. (2024). Prevalence of non-communicable disease risk factors among nursing staff in a low and middle-income country: A cross-sectional digital survey-based study. *International Journal of Nursing Practice*, e13263. https://doi.org/10.1111/ijn.13263